

Simplifying the Process of Recognizing Excellence: a database system for establishing eligibility in Tau Beta Pi

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Abstract

Tau Beta Pi, the engineering honor society for students of all engineering disciplines, seeks to recognize those students of distinguished scholarship and exemplary character. To meet the scholarship requirement, students must be in the top eighth of their junior engineering class or the top fifth of the senior engineering class. Classifying a student as a “junior” or “senior” can be based on institutional classification or, preferably, by estimating the amount of time remaining before the student will graduate. The prevalence of Advanced Placement, International Baccalaureate, and transfer credits has advanced the institutional classification of many students without necessarily having made as much progress toward graduation as that classification would indicate, so these two definitions often show great disparity. If care is not taken at some institutions, the use of institutional classification by itself can result in the recognition of engineering students who have not yet taken a course in their engineering majors.

At Clemson, a database system is used to properly and efficiently classify students as juniors or seniors based on their progress in the engineering curriculum, to enforce other constraints to determine eligibility in Tau Beta Pi, and to generate a variety of reports to assist in the operation of the chapter. In addition to lending insight to the management of student records in general, the process is documented clearly so that it could be implemented by student services personnel, even when faculty do not have the expertise to gather and sort student records. As such, this process could be useful in establishing eligibility for a wide range of honor societies, thus making the recognition of excellence among engineering students simpler and more accurate.

The Challenges of Determining Honor Society Eligibility

Tau Beta Pi first identifies potential members using a scholastic requirement, as is the case for most honor societies. Students must be in the top eighth of their junior engineering class or the top fifth of the senior engineering class. Classifying a student as a “junior” or “senior” can be based on institutional classification or, preferably, by estimating the amount of time remaining before the student will graduate. A recent survey of the membership process of Tau Beta Pi chapters has uncovered several opportunities for improvement.

Data access. As has been the case for years, some chapters continue to have difficulty obtaining eligibility lists in a timely manner—this problem has been exacerbated by legislation and court rulings that have restricted access to student data. Providing students sufficient data to compute the rank in class of all students is a clear violation of federal statutes.¹ As a result, a list of students who are scholastically eligible that is given to the student officers of a Tau Beta Pi chapter must not contain any student grade or rank data. Generally, this takes the process of

evaluating scholastic eligibility away from those who understand it best—the members of Tau Beta Pi.

Classification difficulties

Many engineering students matriculate with credit for Advanced Placement, International Baccalaureate, and transfer classes. Even when students matriculate with credits that count toward engineering requirements, most students find that there is a certain sequence of courses that prevents them from getting much of a “head start” toward an earlier graduation. In some cases, there is a significant disparity between a student’s institutional classification as a “junior” and actual progress in his or her engineering curriculum.

The Two-Fold Effect of Classification Difficulties

In creating an eligibility list, two errors are possible: (1) identifying students as eligible who do not meet the scholastic criteria and (2) identifying students as ineligible who do meet the scholastic criteria. A poor definition of “junior” or “senior” status, including the institutional classification in some cases, can cause both of these errors. While (1) is probably more common, the following example illustrates how (2) can happen as well:

Case Study: Assume that the Clemson chapter of Tau Beta Pi requests a list of “the top 1/8 of junior and the top 1/5 of senior engineering students,” and the registrar uses the university definition of “junior” and “senior.” At Clemson, a junior is a student having 60-94 credit hours, and a senior is a student having a minimum of 95 credit hours. An incoming freshman had taken four AP exams, and Clemson transferred in the courses for 30 credit hours. He also had transfer credit for 1-2 courses taken in the past years and had taken two summer courses. When he matriculated in the fall semester, he started with 45 credit hours. Since a typical engineering student takes at least 15 credit hours per semester, after one semester, this freshman would have 60 hours and be considered a junior. If his GPA were high enough, he would be in the top 1/8th. The chapter would think he is eligible, without knowing that he is not necessarily taking junior classes. Thus error (1) occurs. Further, since the student in the example is counted as an eligible junior, a “real junior” who would have been eligible may be pushed off the list, which is based on a fixed percentage of the class. This causes error (2) above.

Faculty Access to Student Records

While the release of student grade data to a student group is forbidden, faculty members are routinely given access to student-records data. Federal regulations permit and universities typically provide faculty access to the records of students they are teaching. For example, at Clemson, the Student Data Warehouse application automatically grants faculty access to information about students registered for a course they teach—even before the semester starts. For a faculty member to have unrestricted access to all information and reports available in the warehouse, attendance at a training session is required. Clemson’s Student Data Warehouse

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provides faculty and staff with easy access to student information that is grouped in tables by university terms. Demographic, enrollment, and course information is available.

For research purposes, Matthew Ohland already had student records access. Because access to student records was granted for other reasons, permission to use those records to generate eligibility lists for Tau Beta Pi was requested and received.

Defining Student Classification

In order to ensure that students considered for membership in Tau Beta Pi have all begun engineering coursework in their major, the first step is being able to identify from student records which students are seniors (within one year of graduation) and which students are juniors (within two years of graduation). At Clemson, the junior-level curriculum is characterized courses with 300-level numbers, and the senior-level curriculum is characterized by courses with 400-level numbers.² This criterion, in addition to university classification, is sufficient to correctly classify students. *Senior* and *junior* are defined as follows:

Criteria for classification as a senior

- 1) majoring in one of Clemson's seven engineering programs
- 2) university classification as a senior
- 3) enrolled in at least one 400-level engineering course

Criteria for classification as a junior

- 1) majoring in one of Clemson's seven engineering programs
- 2) university classification as a junior or a senior
- 3) enrolled in at least one engineering course 300-level or higher

These criteria would need to be defined at the local institution based upon the engineering curriculum at that institution.

Writing and Testing an Eligibility Database

Querying a database is a simple level of set theory—each of the criteria defines a set of students, and the list of eligible students is the result of intersecting all the appropriate criteria. In this case, eligibility requires that students be in the top 1/8 of the junior class or the top 1/5 of the senior class. This is implemented by listing the students who are classified as juniors and seniors, rank ordering each list, and identifying the GPA cutoff that marks eligibility in each group.

The testing phase was critical, because quirks in the data system (and errors by the programmer) have the potential to systematically screen out students who would otherwise be eligible. Testing was conducted by generating eligibility lists for previous semesters and comparing them to the eligibility lists received from the administration in those semesters and by a manual review of the list output. The most glaring error was that Biosystems Engineering has a major code in Clemson's database that is not numerically similar to the other engineering majors—because the Biosystems Engineering program is affiliated with the College of Agriculture, Forestry, and Life

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Sciences. As a result, the first version of the database system systematically screened out all Biosystems Engineering majors—a simple error to catch. Other minor errors were corrected, and the queries determining eligibility have not required modification since the first semester they were used.

Other Benefits of Using the Eligibility Database

Normally, once a Tau Beta Pi chapter obtains an eligibility list, there is much work still to be done. It falls to the chapter officers to obtain other information about the students in order to invite them to membership—their major in order to be able to deliver letters, their email address to send an electronic invitation, their phone number to check if they are interested, and their permanent address to send a letter of congratulations to their parents. While this information is available to chapter officers through the administration or through university directories, students can be especially challenged if these data cannot be obtained in electronic form.

Because the eligibility list at Clemson is being compiled from university databases, we automatically have other useful information—major, local address and phone number, permanent address and phone number, and email address. As a result, a set of queries are used to sort the list in different ways and to incorporate different kinds of information:

- the output of the primary eligibility query is formatted so that it is ready to copy into an Excel template for eligibility list submission provided by Tau Beta Pi Headquarters. This format includes identifying which students are members.
- another query defines the students who will receive invitations—primarily, this list eliminates the students who are already members. Many chapters invite these students because they are too difficult to sort out ahead of time, but sending invitations to members is unprofessional and wastes time and postage.
- another query identifies which of the students who were previously initiated are enrolled on campus each term. This defines which students will receive email from our member listserver for the semester.
- another query updates the list of initiated members from the list of students initiated in the previous semester. This allows the chapter to keep an updated list of chapter membership.

In addition to generating these supplementary lists, the eligibility database makes it easy to identify students who are in special categories—such as transfer students and co-op students.

The Bottom Line

The database system for generating eligibility data allows Clemson advisors to obtain lists quickly, accurately, and conveniently. Further, these lists include other data that are needed to invite eligible students, such as their email addresses. It is of significant advantage to have those data in electronic form. The system is easy to update for a new semester, and implementation will be transferred to a staff member in the dean's office in the coming year to ensure the longevity of the system.

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The most telling indication of the effectiveness of this system is this:

**In less than 2 hours on the second day of the semester,
the Chapter President and Chief Advisor accomplished the following**

- Incorporated the students initiated last semester into a table of all members initiated by the Clemson Chapter of Tau Beta Pi
- Selected a set of proposed dates for the Chapter events in the coming semester
- Updated, merged, and printed a letter from the Chapter President and Chief Advisor to all eligible students who were not already members
- Merged and printed labels to address the student letters
- Updated, merged, and printed a letter from the college dean to the parents of the students who were not already members (these are later signed by the dean)
- Merged and printed labels to address the parent letters
- Updated and sent an email from the Chief Advisor to all eligible students who were not already members, sent with replies automatically delivered to the Chapter Vice President and with a request for a return receipt so the Chapter can track which students are known to have read the email.
- Ordered brochures for stuffing with the parent and student letters (should have done this before the semester started, but they still arrived in time)
- Generated the official eligibility list to sent to the TBP Headquarters (in the correct format)
- Generated a list of all students initiated in the Clemson Chapter of Tau Beta Pi who are currently enrolled on campus (this is used to create a list for a Chapter listserver)
- Incorporated the new group of eligible students into an Excel file that is used to track their progress through the Chapter's candidate process

How other chapters of Tau Beta Pi can benefit from this work

While the process of identifying juniors and seniors will vary from one engineering school to another, the database designed and implemented at Clemson defines an infrastructure that other chapters of Tau Beta Pi (and other honor societies) can adapt for their own use. If new criteria defining juniors and seniors are entered into the appropriate queries in the database (a simple matter), the database will again be ready to generate lists of eligible students, a mail merge to invited students and their parents, mailing labels, and the other useful information.

To be able to access all the features of the database, at least one advisor of a Tau Beta Pi (or other society) chapter would need to have access to student records data—this will not be given to students. At Clemson, these data were already being gathered for the purposes described—the database system just automated the process. Particularly, cumulative grade point average is needed to determine ranking, parent mailing addresses and student phone numbers are needed for contact purposes, current term enrollment information is needed, and current chapter members are needed for the query to distinguish those students who should be invited to membership.

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¹ Family Educational Rights and Privacy Act (FERPA), Department of Education, United States government, <<http://www.ed.gov/policy/gen/guid/fpco/ferpa/index.html>>, last accessed January 10, 2004.

² Clemson University Undergraduate Announcements, College of Engineering and Science section, <http://www.registrar.clemson.edu/publicat/catalog/2003/rr03_es.html>, last accessed January 5, 2004.