Paperless Advisement of CM Students via Electronic Spreadsheets

Gustavo O. Maldonado, Ph.D., P.E. and Brian C. Moore, Ph.D.
Georgia Southern University
Statesboro, Georgia

This article presents a paperless academic advising tool based in password-protected electronic spreadsheets programmed with Microsoft Excel 2007. The proposed tool is presently employed to advise undergraduate students pursuing a four-year Construction Management (CM) degree. It presents several advantages with respect to the former paper-based advising procedure. E.g., the suggested course sequence and all course prerequisites are directly visualized in a flow-chart type scheme. All curriculum information (main and alternative elective courses, credit hours, minimum passing grades, core curriculum areas, etc.) is also presented in the worksheets. A graduation clearance form is automatically generated by extracting information from the main worksheet. Students input data regarding their courses, their grades and attended terms. Advisors use this information to suggest primary and alternate courses for next academic term and for the term after next. This only requires the use of four numbers (1-4). Each semester, information can be swiftly updated during each advising session. All advisement information is stored in a computer server accessible to all faculty advisors and administrative personnel. A second worksheet has been generated and programmed using a non-native Excel function to extract information from all students’ post-advisement worksheets and estimate student demand for CM courses in future academic terms.

Key Words: academic advising, CM program, electronic spreadsheets, Microsoft Excel 2007

Introduction

Presently, academic advisement of undergraduate students is implemented by numerous institutions of higher education across the USA and the world. Six years ago, the United Nations Educational, Scientific, and Cultural Organization, published a document (UNESCO, 2002) where it lists the following purposes, or functions, of academic advising:

1. To assist students in developing educational plans that are consistent with their life goals.
2. To provide students with accurate information about academic progression and degree requirements.
3. To assist students in understanding academic policies and procedures.
4. To help students access campus resources that will enhance their ability to be academically successful.
5. To assist students in overcoming educational and personal problems.
6. To identify systemic and personal conditions that may impede student academic achievement and developing appropriate interventions.
7. To review and use available data about students academic and educational needs, performance, aspirations and problems.
8. To increase student retention by providing a personal contact that students often need and request, thereby connecting them to the institution.

The National Academic Advisement Association (NACADA) summarizes the concept of academic advising as: “Academic advising, based in the teaching and learning mission of higher education, is a series of intentional interactions with a curriculum, a pedagogy, and a set of student learning outcomes. Academic advising synthesizes and contextualizes students’ educational experiences within the frameworks of their aspirations, abilities and lives to extend learning beyond campus boundaries and timeframes.” (NACADA, 2006).
The above list and statements are general in nature and tailoring occurs at the institutional level. For example, there are several organizational models and delivery systems. According to King, the centralized model, where all advising is performed in a single unit or Advisement Center, is more typical of two-year institutions. On the other hand, the Faculty-Only model, where advising is exclusively performed by faculty members, and the Split Model, where advising is performed by centers and by faculty members, can be found at both, two- and four-year institutions (King, 2002). Also, the scope, role, and responsibilities for academic advising may differ across institutions. In this article, the authors have attempted to resolve advising difficulties experienced at one university.

In particular, the authors’ institution presents the following advising philosophy: “A student’s satisfactory completion of a degree program is his or her own responsibility. Any system of advisement must reflect students’ freedom of choice and their right to make their own decisions. It is the institution’s responsibility to provide guidance, information, and assistance to the student whenever possible. It is the institution’s responsibility to see that advisors have accurate information, are concerned about students, and are accessible to students on a reasonable basis. The institution also has responsibility to provide the necessary support to those faculty members who choose advisement as an area of service and to see that good advisement is appropriately included in merit considerations. Georgia Southern accepts the philosophy that faculty members should be involved in student advisement since they provide a necessary academic orientation to the process. It is important that students have as much direct contact with faculty as possible and advisement is a particularly individualized avenue of communication. Advisement also provides the faculty member with a vital area of service.”

Until recently, the authors’ academic unit had a paper-based advising system that presented numerous drawbacks. During each advising period, students had to complete certain paperwork. They filled in curriculum sheets with information on courses already taken, and filled in registration forms with advisor-suggested courses. Due to students’ errors or omissions, advising mistakes often occurred. Also, due to poor course selections and the non-satisfaction of required prerequisites, students often found themselves in gridlock situations unable to register in enough required courses to attain full-time student status. In turn, these problems and their solutions required additional time dedication from faculty members and administrators. Advisors’ suggestions were recorded in paper (forms) and kept in a special location, but their accessibility presented a problem. A special location, accessible to all faculty advisors and administrative personnel had to be dedicated to store them. Even though these records were available, they did not allow for a quick estimation of students’ future course demands.

Because of the challenges faced by faculty in terms of teaching, scholarship and service, the ability to streamline the advising process warranted further exploration. The authors of this paper have worked together to prepare a system that serves to improve the efficiency of advising, the continuity and portability of a student’s advising records, and the use of those records to estimate course demands for subsequent academic terms. In this regard, herein, they present an advisement procedure characterized by the use of two password-protected electronic spreadsheets. One of them targets advisees who prefer a visual approach to follow their curriculum progress and one that is non-graphic based, but clearly shows the progress towards graduation.

**Former Advising Procedures**

Presently, the authors are affiliated with a CM program that is part of a Technology Department in a College of Science and Technology (COST). This college uses the Split Model of advisement. That is, freshman and sophomore students are advised at the COST Advising Center by professional counselors and faculty members; and junior and senior students, who have already declared their CM major, are advised only by CM faculty members.

This CM program consists of eight full-time faculty members and serves, approximately, 500 CM students. Consequently, each faculty advisor is assigned sixty-three advisees, approximately. However, this number fluctuates from semester to semester. Data from Fall 2006 to Fall 2008 shows that the number of advisees has ranged from 60 to 100 per faculty member. Advisors are instructed to dedicate 15 to 20 minutes to each advisee during scheduled advising sessions. In an academic semester, this represents 20 to 34 hours of contact time of advisee-advisor interaction. However, not all students attend their advising sessions. In each major semester, Fall or Spring, advisement is concentrated in two weeks, but it continues until the end of the semester. This is because not all students attend their scheduled appointments and new students transfer into the program.
In the former system, a typical 15-to-20-minute advisement session included the following six tasks:

1. The student visited with the advisor who retrieved the student’s hard copy file containing the corresponding handwritten advisement records.
2. The student and advisor discussed the courses already taken, the ones that were currently being taken, and identified the ones needed for the next academic term. For this, students were required to fill in the curriculum sheet shown in figures 1 and 2. Alternatively, they were asked to update a similar sheet kept in their files, but this consumed precious advising time and advisors preferred that students complete a new curriculum sheet before each advising session.
3. With the above information, the advisor understood the student’s current position in the CM curriculum and suggested primary and alternate courses for the next term. This was done to avoid prerequisite conflicts and to minimize required time to attain graduation.

![Figure 1: Former Curriculum Sheet – Partial view of its front side](image1)

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Name</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 1111</td>
<td>General Physics I</td>
<td>Trigonometry</td>
</tr>
<tr>
<td>PHYS 1113</td>
<td>Physics Lab I</td>
<td>Prerequisites or Corequisite: General Physics I</td>
</tr>
<tr>
<td>TCM 1120</td>
<td>History of Architecture</td>
<td>None</td>
</tr>
<tr>
<td>TCM 1130</td>
<td>Architectural Graphics &amp; Print Reading</td>
<td>CISM 1110/1120</td>
</tr>
<tr>
<td>TCM 1131</td>
<td>Building Materials &amp; Systems</td>
<td>None</td>
</tr>
<tr>
<td>TCM 2223</td>
<td>Construction Surveying</td>
<td>Trigonometry, Architectural Graphics &amp; Print Reading</td>
</tr>
<tr>
<td>TCM 2226</td>
<td>Introduction to Structures</td>
<td>General Physics I with Lab</td>
</tr>
<tr>
<td>TCM 2241</td>
<td>Mech &amp; Elec Equip Sys</td>
<td>General PHYS I with Lab, Archit. Graph &amp; Print Read</td>
</tr>
<tr>
<td>TCM 3230</td>
<td>Wood Structures</td>
<td>Arch Grap &amp; Print Read, Intro to Structures</td>
</tr>
<tr>
<td>TCM 3231</td>
<td>Steel Structures</td>
<td>Arch Grap &amp; Print Read, Intro to Structures</td>
</tr>
<tr>
<td>TCM 3232</td>
<td>Concrete &amp; Masonry Structures</td>
<td>Arch Grap &amp; Print Read, Intro to Structures</td>
</tr>
</tbody>
</table>

![Figure 2: Former Curriculum Sheet – Partial view of its back side](image2)
The student filled in a registration form (original and carbon copy) with personal information and with the primary and alternate courses suggested by the advisor.

The advisor used student’s personal information (last name and student identification number) to obtain the registration code (number) that this particular student needed to register online. This number was also written down in the registration form.

The student’s file was updated and the carbon copy of the registration form was added to the student’s advising records.

These six tasks needed to be performed during a scheduled 15-to-20-minute time slot, otherwise the following advisees were delayed. To avoid delays, students were requested to arrive at their advising session prepared. That is, they should have studied and been already familiar with the CM curriculum, the suggested sequence of courses, the prerequisite requirements, and should have filled in all their personal information in the corresponding registration form by hand.

The above procedure presented several drawbacks:

(a) Even though students were reminded, on numerous occasions, about the required preparation before attending their advisement appointment (via various media, such as mass emails, in-class announcements, banners, posters, flyers, etc.), there were always a large percentage that arrived to their appointments partially prepared or completely unprepared. Curriculum sheets were incomplete or erroneously completed. Usually, the totally unprepared students were required to reschedule their appointments.

(b) Many students had completed their curriculum sheets, but had minimum or nil knowledge of course prerequisites or of the CM curriculum in general. Possibly, a factor contributing to this situation was the fact that prerequisites were not easily visualized. They were just listed for each course on the back of the curriculum sheet. This did not facilitate the identification of critical courses that needed to be taken before others could be taken.

(c) Others students were in a gridlock situation. That is, due to unsatisfied prerequisites, they were not able to register into enough required courses to attain full-time student status.

(d) All cases described in points (a), (b), and (c), required special attention and delayed the advisement schedule for that particular day. In many instances, the required advisement time was more than the planned 15-20 minutes and students needed to wait.

(e) In addition to regular advisement, several junior and senior students visited their advisors to complete their graduation clearance form. This was not a simple task because the software used by the institution to control the completion of all required curriculum areas was misplacing courses in wrong areas. Therefore, faculty advisors were asked to fill in an online form to inform needed corrections for each advisee requiring clearance for graduation.

(f) The advisement files of each student were gradually increasing in size. At least two sheets of paper were added per advisement session. Also, in certain cases, pages containing explanatory notes needed to be added. However, many curriculum sheets contained partial information or erroneous information.

(g) Several students reported advisement problems. In one particular case, a student took a course he had already taken. He realized it after attending class for one full week. The problem was that he did not mark that course as already taken in his curriculum sheet. So, the advisor recommended he take it.

(h) The location of advisement files was also a problem. They were needed by faculty advisors and also by administrative personnel, so they needed to be kept in an orderly manner and in an area with common access.

**Proposed Paperless Advising Procedure**

**Advisement Workbook**

In an attempt to improve the former process, a new procedure is proposed. It still employs the face-to-face advising interactions, but uses two linked programmed worksheets in a single workbook (MS Excel 2007). They are used to facilitate student understanding of the CM curriculum, to standardize advising information, and to make the advising data more portable. The first worksheet shows all required courses to attain a Bachelor’s degree in construction management. They are ordered according to the official suggested sequence. Also, this spreadsheet shows arrows
to indicate all course prerequisites in a flow-chart fashion. That is, all prerequisites are directly visualized on it. This is presented in figure 3. The second worksheet, in figure 4, is a graduation clearance form linked to the first worksheet. Its purpose is explained below. Most of the data is input in the first worksheet and is automatically sent to populate the second one.

Students fill in the new advisement worksheet (figure 3) with their personal and course data (grades, attended semesters and years). To facilitate advisors’ course suggestions, the cells containing students’ grades are conditionally formatted. Passing grades (A, B, and C) are shown with a green background, passing D grades are in yellow and non-passing grades (certain D’s and all F grades) are shown in red. The courses that students are currently taking, or registered in, are indicated with an R grade, in a purple background. Suggested primary courses are shown with a grade equal to one (1), in blue. Suggested alternate courses are shown with a grade equal to two (2), also in blue. Similarly, suggested primary and alternate courses for the term after next are shown with grades equal to three (3) and four (4), respectively, both in brown. The automatic color coding and the prerequisite arrows facilitate the visual selection of appropriate courses for the following academic terms. It is expected that this feature will help prevent or minimize gridlock situations where, due to unsatisfied prerequisites, students cannot register into required courses and delay their graduation times. This worksheet substitutes the front side of the former curriculum sheet (figure 1).

The second worksheet (figure 4) extracts information from the first one (figure 3) and places courses, grades, and attended terms, in the appropriate curriculum areas. That is, as students complete the first worksheet, the graduation clearance sheet is populated automatically. The main purpose of this worksheet is to properly locate successfully taken courses into the corresponding curriculum areas. This facilitates the clearance for graduation process performed by personnel in the Registrar’s office. At the same time, it saves faculty advisors’ time. There is no longer the need to use an online form to correct the location of courses. This spreadsheet contains all the information that Registrar’s office personnel need to perform clearance for graduation procedures.

The new worksheets are password protected. Only cells accepting data are accessible by users. Access is denied to all other cells. This is required to avoid changes and preserve the cells containing programmed statements.

This Fall semester, one week before the start of the advising period, a blank advisement workbook was electronically mailed to all CM students. It contained minimum instructions on how to fill in the corresponding data. It was required to be sent back to the departmental secretary fully completed and renamed as
In particular, during these two advisement weeks, one of the authors advised 50 of his 63 advisees. This represents 79% as opposed to a 48-52% range that occurred in the last four semesters using the old advising system. This may indicate that students felt more attracted to this new system or found it more useful than the previous paper-based one. In fact, numerous verbal comments were positive about the new worksheets. However, the new process seems to be only slightly faster than the previous one. This may be due to the fact that the old process is being compared against the first implementation of the new one. During this first time, numerous students’ worksheets required needed corrections before advising could be performed. This consumed time. It is expected that subsequent advisement sessions will be faster.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
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<th>K</th>
<th>L</th>
<th>M</th>
<th>N</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Bachelor of Science in Construction</td>
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<td>2</td>
<td>Graduation Clearance Sheet</td>
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<tr>
<td>3</td>
<td>Student Name: FIRST M. LASTNAME</td>
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<td>4</td>
<td>Student Number: 900999999</td>
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<td>Program Entry Term: SUMMER 2005</td>
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<tr>
<td>6</td>
<td>Core Curriculum Area A - Essential Skills (9 hrs required)</td>
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<tr>
<td>7</td>
<td>Course Number &amp; Name</td>
<td>Win</td>
<td>Sem</td>
<td>Year</td>
<td>Grade</td>
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</tr>
<tr>
<td>8</td>
<td>NNN 1101 - Calculus I</td>
<td>3</td>
<td>SP</td>
<td>4</td>
<td>A</td>
<td></td>
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<tr>
<td>9</td>
<td>ENGL 1101 - Composition I</td>
<td>3</td>
<td>SP</td>
<td>5</td>
<td>B</td>
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<td>10</td>
<td>MATH 1101 - Calculus I</td>
<td>3</td>
<td>SP</td>
<td>5</td>
<td>B</td>
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<tr>
<td>11</td>
<td>NNN 1200 - Calculus II</td>
<td>3</td>
<td>SP</td>
<td>4</td>
<td>C</td>
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<td>12</td>
<td>Additional Requirements (5 hrs required)</td>
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<tr>
<td>13</td>
<td>Course Number &amp; Name</td>
<td>Win</td>
<td>Sem</td>
<td>Year</td>
<td>Grade</td>
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<tr>
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<td>3</td>
<td>SP</td>
<td>4</td>
<td>C</td>
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<td>SP</td>
<td>5</td>
<td>B</td>
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<td></td>
</tr>
<tr>
<td>16</td>
<td>MATH 1101 - Calculus I</td>
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<td>SP</td>
<td>5</td>
<td>B</td>
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</tr>
</tbody>
</table>

**Figure 4:** New automatically generated worksheet containing graduation clearance information – Partial view

**Report Workbook**

A second workbook has been programmed to extract all grades and suggested-course information from all students’ post-advisees workbooks. The main purpose of this Excel spreadsheet is to estimate the number of seats needed in each CM course during the following academic terms. Figure 5 shows a partial view of it. It assumes one seat
per student who has been advised to take a course with a number 1 (primary course). Also, it assumes 0.5 seat per student who has been advised to take a course with a number 2 (alternate course). However, both weighting numbers can be modified by the user.

Excel has a powerful function: INDIRECT(). It allows referencing to the content of a cell by reading the corresponding cell address from another cell. This permits acquisition of data by programming the addresses of the cells that contain the required information. In particular, it can be used to program the names of source files, worksheets and cell addresses from which data can be extracted. However, it only works if the source files are open. This is not our case. All students’ post-advisement workbook files are closed. Fortunately, a set of free functions, programmed by a French Excel expert, Laurent Longre, are available online to be included in Excel 2007 as an add-in (http://xcell05.free.fr/morefunc/english/). They contain an extension of the INDIRECT() function: INDIRECT.EXT(). It works as the original INDIRECT(), but can be used with closed files. However, it takes time to open, access, and close those files each time data needs to be extracted.

The mentioned Report worksheet uses the INDIRECT.EXT() function. When run in a personal computer with a Pentium® D, 3.00 GHz processor and 2 GB of RAM, it took approximately 10 seconds to extract the information corresponding to one student. It took about 45 minutes to process 268 students. In order to avoid time consuming automatic updates of the acquired data values, the second parameter of the INDIRECT.EXT() function has to be set to FALSE. This will preclude the occurrence of automatic updates. This does not affect the results because an update of the variables is not needed unless data is changed in the students’ post-advisement workbooks (source files). If that were the case, the sequence Ctrl+Alt+F9 can be used to produce a manual update. However, for 268 students’ files, this update will require an additional 45 minutes.

A complete list of post-advisement file names needs to be input into the Report Excel file so all those files can be accessed. Such list can be obtained via the following DOS command: Dir /A > C:\mytextfile.txt. However, this command also generates non-required information (such as file creation dates, times and sizes). The unnecessary information can easily be deleted by using the Crimson Editor. In this regard, this is a helpful piece of software. It is a free text editor with a useful column selection feature that facilitates the deletion of the unnecessary information. It can be downloaded from http://www.crimsoneditor.com/.

Conclusions

This work presents a paperless tool for academic advisement of students attending a CM program. It is based on two simple, password-protected MS Excel worksheets contained in a single workbook. The main worksheet
presents the Suggested Course Sequence. The second worksheet is the Clearance for Graduation Sheet. Both replace a former paper-based procedure. Currently, the proposed new approach is being successfully implemented, for the first time, in the authors’ department. The proposed spreadsheets can be easily modified by individuals with minimum knowledge of Excel to tailor them to other programs or curricula.

During this first implementation, several advantages have been identified:

1. It eliminates paper-based records of students’ advisement. All records are now electronically stored in a computer server accessible by all departmental faculty and administrative personnel. The obviated papers are curriculum sheets and registration forms.
2. After implementing this system for the first time, it will not require returning students to prepare additional materials (lists, forms, etc.) for their subsequent advising sessions. Returning students may verbally inform their advisors about necessary information to update the data in their spreadsheets.
3. New electronic records are updated at each advising session. Since the required new information is not large (data on courses taken the previous semester and on courses currently being attended), the required update time should be minimum.
4. All prerequisites are easily visualized in the proposed Suggested Course Sequence worksheet. Also, this worksheet presents all necessary curriculum information (course names and numbers, prerequisites, alternative elective courses, required minimum passing grades, curriculum areas, credit hours, etc.). This visualization should help students avoid gridlock conditions precluding their registration into required courses and delays in their graduation.
5. Advisors suggest future courses by using simple numbers in the grade cells: 1 and 2 for suggested primary and alternate courses, respectively; and 3 and 4 for primary and alternate courses for the term after next.
6. After each advising session, students receive, via email, a copy of their corresponding advisement workbooks. They should use them to plan their future course selections.
7. The Graduation Clearance Sheet facilitates the comprehension of the completion status of the curriculum.
8. All students’ workbooks are stored in a post-advising folder (directory) in a computer server accessible to all departmental personnel. For each major term (Fall or Spring) a new post-advising folder is generated.
9. Backups of all advisement records can be planned and automatically performed, adding extra security to the stored information.
10. Any faculty member and administrative personnel has the capability to access any advisement workbook from their office computers. This may expedite discussions pertaining to student issues, such as approvals or denials of overrides requests.
11. A Report workbook has been successfully programmed to access all students’ advisement workbooks (even if they were closed) and extract information on suggested courses. After advisement is completed, it is possible to use the results contained in this worksheet to estimate the number of seats necessary in each CM course offered next term. This facilitates early decisions on the number of necessary sections to satisfy next term demands.

Overall, this new advising system appears to be properly working during its first cycle of use in Fall 2008. It is expected that improvements and adjustments will be incorporated after feedback is received from students and advisors currently using it.

References

