Assessment Methodology

The assessment means for SYSE 591 Fall 2010 class consist of three parts: (1) Direct observation by the instructor, including verbal comments and suggestions from the students in the class, (2) Review of materials used in class, and (3) Comparison of student stated objectives of the course to the actual outputs.

These means are evaluated by the instructor to determine key areas or topics that need to be continued or enhanced in order to achieve course and student goals. This is a continual improvement process in that assessment is performed after each term and rapid response to areas identified is planned with the intent of executing by the next time the course is taught.

Key Topic Areas

Key topic areas identified this term surround three areas: (1) More introductory textbook geared to novice in Systems Engineering, (2) Modeling language formality, and (3) Presentation style adjustments.

More introductory textbook geared to novice in Systems Engineering

Prior assessments of this course have typically included a component surrounding the use (or lack thereof) of a formal textbook to provide a foundation for the course. In prior years, the course was taught entirely without a formal textbook which left the students feeling disconnected from the basics of systems engineering. The first textbook, James Martin’s “Systems Engineering Guidebook” filled the basic need for a textbook to provide a foundation, but was discovered in practice to be unwieldy from a pedagogical standpoint as well as confusing to students unfamiliar with systems engineering terminology and methods. There was significant expectations and assumed prior knowledge. Many students indicated that eh text would be better as a reference guide after graduation, but was ineffectual as a learning tool. The decision was made to switch to Kassiakoff and Sweet’s “Systems Engineering: Principles and Practice”. While being a much better book from a pedagogical standpoint, the order of topics and lack of practical depth made the book of limited value to the student. Expressed concerns were, again, focused on the book lacking a overall picture or statement of objectives for the systems engineer and the usefulness more as a reference guide than an introductory text. The instructor spent significant time after the last class to locate a more desirable textbook that would meet these fundamental objectives and has determined to switch the course to Sage and Armstrong’s “Introduction to
Systems Engineering”. This text provides a more introductory perspective to the field of systems engineering while still maintaining a pedagogical consistency and applicability for an online course. In addition, the problems presented in the text are self-contained and do not require extensive research on part of the student to understand the domain terminology, as was the case with Kassiakoff and Sweet. An added benefit of the Sage and Armstrong text is its inclusion and presentation of Systems Dynamics and Reliability as topics of understanding for the student. This will enable a smoother and non-conflicting transition for the student if they choose to pursue those two courses as electives.

The course readings and presentations will be revamped for the Fall 2011 term to support the use of Sage and Armstrong, the prior text will be referred to as an optional reference text (along with Martin) for those students who wish to have deeper context in the topics presented.

*Modeling Language Formality*

Many parts of the course and in systems engineering, in general, the need for modeling the system of interest is needed. While the modeling concepts for dynamics analysis and simulation are covered in required courses of those areas, there is a lack of formal model documentation in student assignments and projects. The root cause of this lack of formality is that the introduction of a formal language is not present. The frustration expressed by the students in comments and discussion areas surrounding “who do I express this system” or “how do you want the system documented” cements the need for the introduction of a formal method or language to document the system.

After reviewing industry standards, the use of SysML [an augmented version of Universal Modeling Language (UML)] is an adequate candidate. In addition to meeting the needs expressed by the students, it it also support by INCOSE and will enable the graduating students to have a foundation in tools and methods currently used in practice. To support the use of SysML in the course, the need for two additional texts as well as the modification of current systems diagrams present in the course into SysML. Following that, additional course work to bring the student up to speed in the use of SysML is also needed and will be integrated into the coursework as an ongoing parallel but connected learning effort.

The two textbooks chosen to support the use and introduction of SysML into the course are: Friedenthal’s “A Practical Guide to SysML” and Weikens’ “Systems Engineering with SysML/UML”.

The further expansion and dissemination of SysML concepts to the other courses will be reviewed after the first term of SYSE 591 is taught with
those concepts, as the need to convert those courses is not critical to their own objectives and it would be advisable to wait before expending resources until the success has been shown in SYSE 591.

**Presentation Style Adjustment**

The decision to switch to Direct2Learn (D2L) from WebCT has provided an opportunity to evaluate the presentation methods used in the online component of SYSE 591. To provide more demonstrative concepts the use of Abode Captivate is being considered. This is also to assist in the introduction of SysML since this is something where a more animated demonstration is necessary to get the concepts across adequately. The prior use of Authorware modules has to be discontinued since the browser support for that add-on is inconsistent with the D2L interface.

In addition, the continued use of pre-recorded video lectures that the students respond to well will be expanded. The use of other modalities of communication, including Skype will also be introduced into the course. The decision to put aside the suggestion to make a Facebook page for the course is to prevent ambiguity as to the nexus of the course’s online presence. D2L is a new enough system that has its own set of challenges to a novice student (SYSE 591 being the typical first online course for most students), that adding the complexity of an additional Facebook page for communication is not prudent at this time.

**Action Plan**

*More introductory textbook geared to novice in Systems Engineering*

Conversion of course material to support and include the use of the Sage/Armstrong, Weilkiens, and Friedenthal texts while shifting the use of Kossiakoff/Sweet to a reference text. Leveraging the use of the more introductory level problems included in the Sage/Armstorgn.

*Modeling Language Formality*

Convert all diagrams to industry standard SysML. Develop additional curriculum to introduce SysML as a parallel but integrated learning stream into the course. Update course objectives to include SysML documentation understating and use. Provide means to evaluate the expansion of SysML to other courses in the program after experimental term has completed.
Presentation Style Adjustment

Course material will be migrated to D2L system. Additional modules will be created in Adobe Captivate and Adobe Premier. Authorware modules will be converted to equivalent Captivate modules to support the new presentation platform. The integration of Skype and other communication modalities will be added within the D2L framework.

Facebook and additional communication portal development will be deferred at this time and reassessment will be made next term.

Expected Date of Implementation of Action Plan

Fall 2011
<table>
<thead>
<tr>
<th>Rubric</th>
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<th>4</th>
<th>3</th>
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<th>SCORE</th>
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<tbody>
<tr>
<td><strong>Distance Learning - Instructional Design</strong></td>
<td>In addition to the requiring students to communicate with the instructor, instructional activities require students to work with one another (e.g., in pairs or small groups) and outside experts and share results with one another and the rest of the class</td>
<td>In addition to the requiring students to communicate with the instructor, instructional activities require students to work with one another (e.g., in pairs or small groups) and share results within their pairs/groups</td>
<td>Instructional activities do not require two-way interaction between instructor and students; they call for one-way delivery of information (e.g., instructor lectures, text delivery).</td>
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<td><strong>Distant Learning - Learner Response</strong></td>
<td>By the end of the course, over 75% of students in the class are initiating interaction with the instructor and other students on a voluntary basis (i.e., other than when required).</td>
<td>By the end of the course, between 25-50% of students in the class are initiating interaction with the instructor and other students on a voluntary basis (i.e., other than when required).</td>
<td>By the end of the course, all students in the class are interacting with instructor and other students only when required.</td>
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<td><strong>Distant Learning - Instructor Responsiveness</strong></td>
<td>Fully student engagement from instructor even outside of learning platform. Students proactively comment on instructors accessibility</td>
<td>Limited instructor engagement. Students comment either verbally or written, on lack of feedback or inquire more than twice on homework status or key dates</td>
<td>Instructor effectively absent. Students are left with little to no feedback, comment to program director on whereabouts of instructor.</td>
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<td><strong>Engineering - Application</strong></td>
<td>Course fully integrates with actual industry problem that may run through entire course. Tangible outputs from course activities used by industry sponsor</td>
<td>Course could provide meaningful starting point or template for actual engineering scenario. Students are presented with pragmatic realities of application and problems demonstrated are of a complex nature.</td>
<td>Course contains little application to actual engineering problems without need for more in depth study. Focuses primarily on introductory concepts or summary of key issues. Concepts presented with toy problems and do not delve into pragmatic realities of</td>
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<td><strong>Engineering - Theoretical</strong></td>
<td>Fully documented theory presented and derivation presented as well as exercises in course to apply theoretical foundations to require student to determine the applicability of theory to given situation</td>
<td>Course provides some theoretical foundation for concepts. Extrapolation possible, however will require external study to understand limitations and ability to formulate new techniques. May provide general methodologies/algorithms used in tools presented.</td>
<td>Course entirely focused on application, little theoretical grounding presented to enable extrapolation of concepts into other domain areas. Course may focus on the training of a tool rather than on the concepts surrounding the tools development</td>
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<td><strong>Engineering - Tools/Techniques</strong></td>
<td>Integrated use of tool presented or required in course long project. In-depth functions of tool utilized and/or presented. Student would be considered at least beginner skilled with tool upon completion of course</td>
<td>Tools/Techniques presented to level that student could make substantial headway on a tangible project. Working knowledge of technique expressed or demonstrated by at least one assignment.</td>
<td>Tools/Techniques presented introductory. Application limited to basic functions and tutorial type problems.</td>
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<td><strong>Systems Engineering Program Integration</strong></td>
<td>Draws substantially on other SYSE courses, refers to them in course material and has expectation that students fully understood concepts and they are not summarized within course. Course efforts make up significant portion of 590 portfolio</td>
<td>Course draws on other SYSE courses, but could adequately succeed if effort was exerted. Course spends time summarizing potentially missing information, rather than requiring assuming knowledge. May have some ties to 590 project.</td>
<td>Disjoint class with no ties to other SYSE course or 590 project. Specialized domain topic.</td>
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<td><strong>Value Perception</strong></td>
<td>Students recommend course to peers. Student comments indicate applicability or value to current job without further study. Text books are retained (e.g. low used book count)</td>
<td>Students express need for course, but all majority express desire or expectation for more material, tools, techniques.</td>
<td>No student comments, either solicited or unsolicited, regarding application current job. More than one student expresses irrelevance of course. Any students complain to dean of low value course.</td>
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