

## **SYSE 590 .....**

### **Integrative Workshop**

Systems Engineering is an acquired behavior to be developed throughout the Masters degree program. Students and faculty advisors will engage in creative workshop activities integrating technical specialty skills and project experience invoking systems engineering applications of communication, synthesis and creativity, team building, problem solving, management of time and resources, and system life-cycle thinking. A student portfolio will document the program plan and document that the desired behavioral change is taking place.

Hours of credit: Total of 4; variable each term.

Students are expected to devote a total of 120-160 hours to develop a portfolio. Students will be graded (Pass/NoPass) on an on-going basis, and then recorded depending on which terms they enroll in course. The portfolio will summarize the courses taken, relate course topics to each other, summarize discussions with peers and advisors, and document the student's reflection on the relation of course and discussion topics to Systems Engineering.

Advisors are expected to devote at least 100 hours to each student throughout their degree program by providing assistance in the development of study plans, guidance in the integration of course topics, help in the selection of creative exercises, insight regarding systems engineering concepts, and feedback on portfolio progress.

Place in development of department's total program

The program will be enhanced due to: 1) assessment of student progress in meeting learning objectives; 2) coupling of specialty disciplines to SYSE skills; 3) reinforcement of SYSE behavior; 4) assessment of program objectives and assessment of progress toward meeting them; 5) an open forum for discussing program changes; and 6) formal planning of student study plans.

Educational purposes to be served by this course.

The objective of SYSE 590 is to provide an interactive workshop between faculty advisor and Masters student. The student will be challenged to consolidate their project experience and knowledge from elective courses with concepts from the required systems engineering core courses. SYSE concepts of integration, synthesis, and interface management will be continually exercised based on Masters program components.

Methods of evaluation to be used in this course:

Student:

Monitoring student input to Internet discussions, performance on project reports, and development of student portfolio. With guidance from the advisor, the student will define the objectives of their portfolio along with performance criteria, and then reflect on how well their portfolio meets the objectives. The advisor will grade this reflection with special emphasis on the utilization of SYSE concepts.

Course:

Because of its nontraditional nature, course assessment is given a high priority. Examples include:

Monitoring of weekly email, chat, and Bulletin Board discussions,  
Reflection on cumulative Bulletin Board discussions,

Surveys of student impressions,  
Review of entries in each student portfolio.

#### Outline of course:

#### Meeting Program Goals

The learning objectives for the Master of Engineering in Systems Engineering are to improve students' ability to engineer complex products and processes as a consequence of using the systems engineering concepts presented in the Core Courses. The Elective Courses build on students' existing knowledge and project experiences by providing additional domain specialization or project management exposure. Two important concepts presented in the systems engineering core are integration and management of interfaces as related to both physical components and product development processes. In SYSE 590, the student exercises these concepts, using their program of study. Elective course work and project work must couple to systems core courses. Course components must logically interface and build to meet the program objectives. In addition to exercising the concepts of integration for the student, SYSE 590 will provide assessment of student's progress and program integrity, available to other students, faculty and industry partners.

#### Course Goals

SYSE 590 - Integrative Workshop (IW) is a distance learning seminar series, spanning the student's entire program under the guidance of an advisor, thus allowing time to achieve several goals. First, the student is given feedback as discipline skills are applied in a systems settings. Second, the student will be asked to reflect on past approaches as they relate to newer more advanced systems skills. Third, the IW will review systems topics over several academic terms, thus reinforcing their use. In these ways, behavioral change from engineering specialty thinking to systems engineering thinking will be developed. Because of the difficulty of achieving these types of goals, the program must be continuously assessed. Specifically, course modules and groups of courses must integrate to achieve these goals, and if not, corrective changes must be incorporated early in the student's program.

#### Portfolio Contents

The workshops will culminate in a student portfolio that: a) formatively records their studies, b) applies systems principles to their program planning and evaluation, and c) summarizes the academic knowledge and practical experience students gained while in the systems engineering program. The portfolio must contain at least three components.

#### 1. Study plan and record of courses actually taken:

- a. a well thought out study plan,
- b. evaluate progress achieved through this study plan,
- c. assess beneficial changes that occur in study plan.

#### 2. Reflection on coupling of technical specialties and SYSE fundamentals:

- a. connection between the fundamentals learned in past with new advanced systems topics,
- b. relationship of the domain knowledge gained in electives to systems concepts,

- c. use of systems concepts in projects and their impact on the development environment.

3. Exemplify systems engineering applied to review of student's program:

- a. defining the specific objectives of compiling their own portfolio, given that their advisor and employer are customers/stakeholders such as,
  - 1) evidence of competencies
  - 2) additional work in integration and interface management
  - 3) assessment of student's program
  - 4) comparison of student's program to past portfolios
- b. measuring how well these objectives were met,
  - 1) advisor interaction
  - 2) student peer interaction
  - 3) engineering peer interaction
  - 4) supervisor interaction
  - 5) outside studies and case studies
- c. evaluating process at end of their program.

#### Web Archival

Most of the student-to-student and student-to-faculty interaction will be conducted online via the Internet using email and bulletin boards. As inexpensive new technology becomes available (such as Internet TV) additional forms of communication will be incorporated. Students will be encouraged to archive their portfolio on the Systems Engineering web site as a model for future student use and for program evaluation. Personal or proprietary entries in the portfolio will be restricted to student and advisor, but this restriction is not expected to detract from the value of making these portfolios public. Students will also be encouraged to compile their portfolios on a continuous basis and to make available on the web after some reasonable student-faculty interaction. A portfolio template will be suggested to students to make their documentation process easier and foster consistency in the web site design.

#### Academic Integrity

IW will serve as a window for stakeholders and evaluators to view individual student performance and how well the program aids students to attain this performance. Such a safeguard is an imperative when considering the web nature of the program. Two other demands are placed on the IW and the portfolio. Students will not be in a position to give a personal presentation as part of an on-campus graduate seminar, which is traditionally used as a significant component in exit evaluation. The portfolio may serve as the Exit Document. In addition the student will be encouraged to include their project report in the web archives and link it from the portfolio. (As technology permits, the student may also include a presentation video on web, linked from their portfolio). The other demand is the application of original and significant Systems Engineering concepts as part of the project work. The project should demonstrate 9 credits of scholarly work in Systems Engineering. Maintenance of the portfolio on an on-going basis will give formative assessment, and the final document will give summative assessment of the application of Systems Engineering concepts in project work.