Information Packet

CSSE 371

Software Requirements and Specification
Fall 2007

Computer Science and Software Engineering
Rose-Hulman Institute of Technology

Computer Science and Software Engineering 371
Software Requirements and Specification
Fall 2007

Instructor: Sriram Mohan

Office: Moench Hall, Room F203

Phones: (work) 877-8819; (cell) 812-219-9658

Email: mohan@rose-hulman.edu

Project Managers:
Zach Blankenbaker
Michel Lisse
Brittany McNeil

Course Meeting Times:
(Section 1) 7th period MTRF
(Section 2) 8th period MTRF

Office Hours:
TBD (Let's talk in class)

Course Prerequisite: CSSE 230 (Fundamentals of Software Development III) or equivalent

Course Description: Basic concepts and principles of software requirements engineering, its tools and techniques, and methods for modeling software systems. Topics include requirements elicitation, prototyping, functional and non-functional requirements, object-oriented techniques, and requirements tracking.

Course Outcomes: Students who complete this course will be able to

1. Explain the role of requirements engineering and its process.
2. Develop a problem statement using standard analysis techniques.
3. Elicit requirements from stakeholders using multiple standard techniques.
4. Develop a specification with functional and non-functional requirements based on the elicited requirements.
5. Negotiate with the client and other stakeholders regarding priorities and scope.
6. Manage requirements.
7. Apply standard quality assurance techniques to ensure that requirements are: verifiable, traceable, measurable, testable, accurate, unambiguous, consistent, and complete.
8. Develop preliminary design plans (pseudo code) that meet the needs of the intended users of the system.
9. Develop test cases, plans, and procedures that can be used to verify that they have defined, designed and implemented a system that meets the needs of the intended users.
10. Design and prototype user interfaces to validate requirements.

11. Prepare and conduct usability tests to evaluate the usability, utility and efficiency of the developed user interfaces.

Course Texts (Both Required):

- Managing Software Requirements: A Use Case Approach, Second Edition, by Dean Leffingwell and Don Widrig
- Interaction Design: beyond human-computer interaction, Second Edition, by Jennifer Preece, Yvonne Rogers and Helen Sharp

Course Evaluation and Feedback: Please feel free to provide me feedback about the course at any time. Also, an anonymous feedback box under the ANGEL account for this course will be available for feedback throughout the course; I will check it sometime during each weekend. There will also an anonymous midterm evaluation of the course.

I also recommend that you keep a "course evaluation log" somewhere to make notes that you can use for the course evaluation at both midterm and the end of the course.

Course Average Determination:

50%	Software Team Project Work (details below)
20%	Exams
20%	Homeworks
10%	Class Participation (including attendance and quizzes)

Team Project Work Breakdown:

15%	Manager's Evaluation
20%	Clients' Evaluation
10%	Peer Evaluations
10%	Weekly Summary Reports
35%	Other Project Artifacts
5%	Project Presentations

Course Grade Division:

90-100	A
85-89	B+
80-84	B
75-79	C+
70-74	C
65-69	D+
60-64	D
0-59	F

Exam Policy: Exams will be in-class, closed book, and closed notes except for one 8.5 by 11 sheet of paper which you can put notes on using both sides of the page. No exams will be "dropped". If you have a conflict with a scheduled exam, you should notify me immediately. Giving a makeup

exam for an unexcused absence is at the discretion of the instructor. Any requests for re-grading must be made in writing by the beginning of the next class period after the exams are returned.

Homework Grade: There will be approximately two homework assignments each week. The homework's include a variety of tasks that will help each student prepare for the various milestones in the project. The homework will be of great help as you work on the project and can significantly affect the final grade.

Ethics and Professional Practice: You are expected to act honestly and professionally in this course at all times, in a manner consistent with the school's honor code.

Class Participation Policy: There are 40 meeting times during the term. You can potentially receive 10 points towards the class participation portion of your grade for each of those classes in the following fashion:

- If there is a quiz during class, you can earn up to 10 points on it.
- If there is no quiz during class and you attend and make an effort to participate (since with a small class there will be lots of discussion), you will earn 10 points.
- If the class for some reason does not meet, you automatically receive 10 points.

There are 400 possible points, but the Class Participation part of the grade will be computed on a scale of 360 points. (If you get more than 360 points, you still only can get 5% toward the final grade!) In other words, if you miss four classes (10% of the meetings) for absences, is still possible to obtain full credit for class participation.

General Writing Issues: Written communication is important in this course, as it is in the profession in general. Remember that a software document has several unique and important characteristics:

1. Technical documents are often the result of group authorship, thus it requires planning and final tweaking.
2. Specificity and organization are more important than flow, hence technical documentation is often ordered around lists and tables rather than paragraphs.
3. Documentation is often the reader's only source of information on the particular subject or product, hence it must be thorough and complete.
4. Documentation is often used to answer a specific question, hence it should facilitate finding a specific piece of information (navigation).
5. Documentation must bridge from general specifications to particulars of implementation and operation, hence it must make abstract concepts concrete and make concrete facts fit generalized concepts.
6. Documentation can be presented in many forms: online via HTML, MS help files, just plain text, and on paper as reference manuals, tutorial, quick reference guides, etc. It is important to choose the correct medium and even more important to write to fit the medium.

You can always drop by my office, if you have any questions regarding your document. I would be happy to look at it and suggest some changes. You should also be aware of the service provided by the Learning Center.

Late Submissions: Late quizzes will not be accepted. Late homeworks or project assignments may receive a deduction (or not be accepted at all), depending on the circumstances and the degree of lateness.

Project Grade: The various artifacts you will produce as a part of the project will be organized into milestones. There is no set scale or weighting for individual milestones. They are there to give you concrete immediate objectives, valuable feedback and metrics for evaluating your progress. The success of a team depends on the contributions of each and every team member; a member who does not participate in and contribute to his or her team project can be removed from the team on the recommendation of the project manager.

Project Schedule and Deliverables: During the fall quarter, the teams will interact with their respective clients to elicit requirements and define the system. In addition, each team will also produce a preliminary design to implement the system and a test plan to verify that the developed system meets the user needs. The team will also produce a usable and effective user interface and verify the same via usability tests.

Deliverable	Contents	Due Date
Milestone 1	Current System Analysis Client Stakeholder Analysis Feature Listing Project Plan	September 20
Milestone 2	Use cases Data Flow Diagram	October 7
Milestone 3	Supplementary Specification Initial Design/Paper prototype	October 14
Milestone 4	Pseudo code Coding Standards Test Cases	October 21
Milestone 5	Usability Report Revised Design	November 4
Final Deliverable	Vision Document Test Plan Design Plan Interface Design Quality Assurance Plan Usability Report **Client Comments**	November 9
Client Presentation		Week of 5th November
Post Partum Presentation	Experiences ...	Week of 5th November

Deliverables in *italics* are due a week before to the project manager. The presentations are due two days before to the project manager.

During the winter quarter, the teams will use the preliminary design plan to develop a detailed design document for the system. Using the detailed design document as a guide, the team will complete implementation of the system. The team will perform acceptance, unit and integration testing (based on the test plan defined in the fall quarter) to verify the system. Usability tests will also be performed to check for ease of use. The implemented system will be verified for quality and

effectiveness by the quality assurance monitor. Note that it is the responsibility of the team to conduct the testing, and the quality assurance monitor will just verify it.

Project Planning: In order to complete the project successfully, it is necessary for the team to work on several tasks at the same time. Each task has a significant lead-time – for contacting a client, reviewing a document, or simply careful deliberation. Do not expect to complete a milestone if you haven't started working on it at least a month before it is due. All of this requires that steps be planned and that the plan be monitored. The project schedule should help you get started on a plan. However, your project plan will require much more detail. While preparing the project plan, you should outline a schedule that will help you meet the various milestones. Parallel schedules must be developed where necessary. We recommend the use of Microsoft Project to prepare the Preliminary Project Plan, even though MS Project provides a lot more functionality than is needed for this task. The reason for this recommendation is that MS Project will be useful during the Implementation and testing phases (CSSE 372) and it is wise to begin learning now. You should have access to Microsoft Project through your MSDN (Microsoft Developer Network) AA (Academic Alliance) accounts. If you have any trouble with this, please contact the instructor.

Project Teams: You will be assigned to a *Project Team* by the 3rd of September. A list of project choices will be available by the 30th of August. Based on your choices (use the survey available on Angel), you will be assigned into teams by the Instructor and the Project Managers. Team assignment will be done with an eye towards providing each team with the necessary balance of skill and capabilities. From time to time, the management might reassign an individual from one team to another, based on changing estimates of man power needs and team abilities. Very rarely, a team member might be "fired" using the mechanism described below.

Project Manger and their Responsibilities: Each team will have a project manager. The project managers will be seniors who have taken the CSSE 371/372 combination earlier. They will provide valuable help to the teams.

Although a manager will often give a team technical guidance, their one specific responsibility is assisting the team with the process. To this end, each team must hold a "project manager meeting" each week, where process related matters are reviewed. Please note that the manager is not the one in charge of these meetings – in fact, the team is still responsible for the conduct of the meeting. The most important process matter is project planning, as reflected in the **Team Log** section below; the log thus produced is the primary deliverable of this meeting. Of course technical matters are often covered at the meeting; it is a good occasion to hold a "walk-through" of some topic. Furthermore, the team often will need to meet more than once a week – perhaps with the manager, with the clients, with the instructor or with other resource people.

The manager has a responsibility similar to a first line manager in a professional situation. Of course, the manager cannot literally fire and hire students, or suggest raises or salary reductions. However, the manager does have at least two ways to encourage performance by the team members.

First, the manager will periodically evaluate each member of the team. This evaluation will be given strong consideration in determining the individual grade for the project. Since the project is a very significant portion of the final grade, this should provide incentive for all team members to perform.

A second, more drastic mechanism is available to the manager if a student is unable or unwilling to work appropriately as a team member. The manager can recommend that the instructor "fire" the student. The instructor will carefully evaluate the student's performance in the context of the team and, if warranted remove the student from his/her team, in effect firing the student from the project. Being fired from a project is sufficient grounds for failing the course unless appropriate remedial action, as agreed with the instructor, is taken. For instance, a "fired" student can be given an appropriate individual project assignment by the instructor. The grade for the replacement project will be reduced by one letter grade, so that the maximum grade is a B. A "fired" student can try to get "hired" by another project manager, but the student will have to make a very good case to succeed.

Quality Assurance Monitor: In addition to serving as project managers, the managers will also be assigned as Quality Assurance Monitors for the CSSE 372 course. Of course, the roles of manager and the QA monitor for each project, are assigned to different individuals. The QA monitor's role is limited but essential, being concerned with procedure rather than content. The QA monitor must sign-off to verify that the team has followed its quality assurance plan. The assignment of the QA monitors will occur at the beginning of the Winter Quarter.

Team Log: The team must maintain a Team Log for the life of the project. The Team Log must record all important team decisions, task assignments, task completions and other task status facts, and design or process changes. All this information must be recorded in a timely manner. The Log should also record role assignments and may also include notes from team meetings.

The Team Log must be a "write-once" document. In order to insure the "write-once" characteristic of the Log, each team is required to email their log to their project manager each week. It is required that the team have one formal meeting a week during which process matters are deal with – in particular, tasks are assigned and task status is reviewed. These process matters are the heart of the Log entry.

You are asked to use a template for your log entry. This is easier for you because it indicates exactly what is required. This is easier for managers and the instructor because we know exactly what to look for. The template is available on Angel. Most of the fields in the template are self-evident, but some deserve a few words of explanation:

- Recording Date – The date on which the secretary edited the log entry.
- Due Date – The date given in this packet on which the milestone is due. This will remain unchanged.
- Group Target Date – The team should set their own internal due date a few days before the milestone is turned in. Record that date here.
- Deliverables Due – A list of those items to be turned in. This will remain unchanged

In most cases, you may need to have two "current milestone" entries. At each meeting when new task assignments are made, those assignments should be logged where indicated. The next week, these assignments should be moved down to the next area, as carry-forward assignments. Tasks remain as carry-forward until after they have been marked as "completed" in the status field. A completed task is then removed from the next Log entry.

The purpose of the Log is to record the following in a consistent manner and place: what tasks must be done, when they must be begun and finished, who is responsible for accomplishing them, and where they stand with respect to their completion.

Team Roles: Roles are associated with ongoing or regularly recurring responsibilities. In some sense a role is just a continuing task, but roles are typically associated with process matters while tasks are more likely to work towards products.

Of course, there are many more roles than there are team members; this necessitates that each team member may be assigned several roles. For example, the various liaison roles may be combined and assigned to one person. Sometimes a role is done collectively by the entire team and thus assigned to the team; only a few roles such as task assignment are suitable for the collective responsibility. In any case, the party or parties responsible for a role must be recorded in the Log.
The project roles are:

- *Secretary:* Maintains the Team Log and takes minutes during meetings.
- *Manager Liaison.*
- *Instructor Liaison*
- *Client Liaison:* It is important that all team members meet with the client for information gathering, presentations and related activities. However, unless there is one person who schedules meetings, makes commitments etc., the client (and the team) is likely to get confused.
- *Task Assigner:* Schedules and assigns tasks based on deliverables and activities identified by the team; major input to the Team Log.
- *Task Monitor:* Tracks status for the Team Log.
- *Convener:* Calls meetings, organizes intra-team communication.
- *Librarian:* Maintains a repository of documents and programs; monitors configuration. Particularly relevant during implementation.
- *Guru:* Toolkit/Language/Platform Specialist. The guru should teach the tool(s) to other team members. Occasionally this role is split to address multiple tools.

There are many ways to organize a small team, but the most common is to have a single leader who makes all the key decisions and divides up the work for the other team members. A more democratic organization in which the team members share the work can also be successful, but the team must be sure that all the key responsibilities are actually met. You are free to choose your own organization, but you are advised to consult with your project manager.

In any case, you must designate one person each as an Instructor Liaison, a Manager Liaison, a Client Liaison and a Secretary (these are not necessarily different people and the identity of the individuals in these positions may change over time). The contacts serve as the primary coordination channel between the team and the Instructor or the Manager respectively.

Document Contents: All milestone documents produced for this class must include the following sections

1. *Title page:* This page must contain the team's name and the document title, and must have the signatures of all the team members. A team member's signature indicates that they have read and approve the contents of the entire document and not just the portion they are responsible for.

2. *Table of Contents:* Every section and sub-section in the document along with the page numbers should be mentioned here. If you are using Microsoft Word, use the Table of Contents wizard. If you are using Latex, this is automatically generated for you.
3. *Executive Summary:* This will be the first section in the document and must briefly summarize the contents of this document.
4. *Introduction:* This will be the second section of the document and will state the purpose of the document and its relation to the rest of the milestones and the software development life cycle.
5. *Main Content:* This will be the main content portion of the document. Follow the template given in the book for the various milestones. The book does not have templates for a Quality Assurance Plan and a Usability Report. Sample copies will be made available in Angel.
6. *References:* Any paper, website or any other external resource you might use to write your milestone document has to be duly referenced. If you are using Microsoft Word, we recommend the use of EndNote. If you are using Latex, you can achieve similar results by using bibtex.
7. *Appendix:* Any extra information that improves the overall readability of the document.
8. *Index:* An index of popular words and the pages they are mentioned.
9. *Glossary:* A list of words (that might be new to the reader) along with their definitions.

Deliverable Submission: You will submit your milestone documents using a large three-ring project binder. You will be required to submit successive milestones in the same binder, so that each is in the context of the preceding and the entire history of project milestones is collected together. To reduce bulk and save trees, you are encouraged to print all documents duplex.

We expect the report to be free of spelling and grammatical errors. All documents to be turned in should be written in a professional manner. Each team member has to take ownership and read and approve the complete document (and not just the parts for which they were responsible) for submission. As the instructor, I would be happy to review any portion of the document at any time and suggest changes.

Client Presentation: The last few days of the class will be devoted to project presentations. Each team will have approximately twenty minutes to describe the product that they intend to produce. There are several reasons for giving presentations. First of all, they give you a chance to exercise your communication skills. You will find that whatever kind of job you choose; you will have to present your ideas to others at one time or another. Secondly, they help the class as a whole since everyone learns about a large number of projects. Finally they provide a basis for comparing the teams for grading purposes.

Your presentation should be based mostly on the Requirements Specification. It should explain (i) who the client is (ii) why the product is desirable and useful (iii) what requirements the client has and (iv) the requirements that are met by your design. You should plan to do a professional job. It will help if you imagine the presentation as a pitch for a client company to invest resources for your project. Remember that you only have a limited time – you will be cut off if you run long and this will hurt your score. It is a good idea to practice your presentation several times before you get up in front of the class.

In targeting the audience of the presentation, imagine that you are speaking to managers who are savvy but not necessarily familiar with the intimate details of technology. You are encouraged to

invite your clients to the presentation or to repeat it for them at their site. The instructor might invite other faculty members in the department and at Rose-Hulman Ventures to sit in on the presentation.

For pedagogical reasons, every member of the team is required to participate in the presentation. It is not necessary that every member talks for exactly the same length of time, but everyone should have something meaningful to say, and everyone should have a designated part of the product that they will be responsible for answering questions about. No written report is necessary for the project presentation.

Post partum Presentation[1]: This presentation gives everyone a chance to benefit from what you have learned during this course and you a chance to learn from others too. We learn most effectively by facing and overcoming problems. If, upon attempting something for the first time, everything goes well, we are likely to assume that the task is easy or that we are especially skilled. This may lead to a casual attitude which could be costly later. On the other hand, if we have trouble, we are more likely to be aware of the pitfalls and avoid them the next time. This enhances the affect by calling our attention to the problems we faced. The intent of the post partum analysis is then NOT to find fault but rather to avoid pitfalls in the future. It is an opportunity for you team to sit down and analyze its mistakes and accomplishments.

Your class presentation should describe your most significant unanticipated problems, both avoidable and unavoidable. Explain how you overcame the problems and how costly it was in terms of time. Suggest how to avoid such problems and assess the risk of the unavoidable problems. Your written analysis should be similar to your oral presentation, but should be more detailed. The written report should be turned in directly to the instructor.

If you so desire, you can also use this presentation to talk about the changes you desire in the class - things that did not go well and have to be changed the next time the course is taught, and things that went well and you would like to see continue.

[1] This presentation is often labeled "post mortem" ("after death" in Latin), reflecting the fact that the process has been completed; however, "post partum" ("after birth") reflects the fact the process has resulted in the delivery of project specifications.