1 Catalog Description

The current university catalog description of this course can be obtained in the University's Catalog: [http://www.gsu.edu/es/catalogs_courses.html](http://www.gsu.edu/es/catalogs_courses.html)

A recent university catalog description follows:

This course provides an introduction to the fundamentals of software requirements management. Topics covered include requirements gathering, system modeling and software specifications. The major emphasis is on using a variety of modeling tools and techniques to define a system specification. Students are also exposed to emerging topics such as components, patterns and reuse that promise major improvements in software development productivity.

1.1 Prerequisites

MS IS program

2.2 Course web site

Web sites for our course is on [www.onedrive.com](http://www.onedrive.com). See your email for details.

3 Overview

This course provides an introduction to the fundamentals of software requirements management. Topics covered include requirements gathering, system modeling and software specifications. The major emphasis is on UML modeling tools and techniques to define a system specification. Students are also exposed to emerging topics that promise major improvements in software development productivity.

Information systems development is a process in which technical, organizational and human aspects of a system are analyzed and changed with the goal of creating an improved system. In spite of the advanced technology that surrounds computer-based information systems, the process of systems analysis and design is still largely an art. There is high dependence on the skills of individual analysts and designers even though there are established principles, methods and tools. This course will give students an understanding of the most common tools, techniques, and theories currently used in requirements management and analysis.
3.1 Intended Audience
Anyone with a keen interest in software requirements management will do well in this course. It's mainly geared to produced Systems Analysts and Systems Architects. However, Programmers, Database Administrators, Software Development Managers, and future CIO’s may benefit from this course.

3.2 Learning Objectives
Students who complete this course will gain “Ready for work” skills, including the following:

1. Describing and analysis with UML
2. Applying CASE tools (IBM Rational tools)
3. Describing and analyzing information systems

More specific objectives, include the following:

1. Understand the requirements management context
   a. Be able to describe the requirements management context.
   b. Be able to describe a requirements management process model.
2. Understand the requirements management artifacts
   a. Be able to describe requirements management artifacts, including: goal/features, requirements, process diagrams, use cases, class diagrams, object interaction
   b. Be able to describe and apply important development methods, including those that produce user models, structural models (classes), behavioral models (use cases), functional models (operations)
   c. Be able to apply CASE tools
3. Know requirements management, comprehensively
   a. Be able to analyze current issues in requirements management
4. Know a requirements management topic, in detail
5. Demonstrate critical thinking, integrative reasoning, & communication skills

3.3 Learning Method
Each week a topic will be presented in two parts:

1. Text book theories of the topic will be presented in a lecture format
2. Students will apply the theory in exercises in which the teacher will serve as guide and assistant—student must initiate the application of theories to the given problem

4 Schedule
The following table defines the schedule. However, the topics and readings may change according to the interests and abilities of the class. See the Academic Calendar. On the web, the underlined items link to supporting information. Materials may be updated 24 hours prior to class; please check before attending class.

<table>
<thead>
<tr>
<th>Readings</th>
<th>In class</th>
<th>Due</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Software Requirements</strong> (Goldstein 2005); (Charette 2005); §1(Alexander et al. 2009)</td>
<td>Virtual Case File, etc. discussion</td>
<td>Milestone 0; Specify group</td>
</tr>
<tr>
<td><strong>Vision document</strong> §6(Zielczynski 2008)</td>
<td>Discuss requirements problems</td>
<td></td>
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<tr>
<td><strong>Stakeholder &amp; goals</strong> §2-3 (Alexander et al. 2009); §7(Lamsweerde 2008)</td>
<td>Specify stakeholder and their goals</td>
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<tr>
<td></td>
<td></td>
<td>Reviewing requirements</td>
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<tr>
<td><strong>Context &amp; scenarios</strong> §4-5 (Alexander et al. 2009); §8-9(Chonoles et al. 2003);</td>
<td>Specify context diagram</td>
<td></td>
</tr>
<tr>
<td><strong>Use cases</strong> §5(Ambler 2004); §12(Chonoles et al. 2003)</td>
<td>Specify system scenarios</td>
<td></td>
</tr>
<tr>
<td>Dason Moccia (OneSpring)</td>
<td>Create use case storyboards</td>
<td>Milestone 1</td>
</tr>
<tr>
<td><strong>Storyboarding</strong> §10-11(Harton et al. 2012); (Kelly 2007)</td>
<td>Animated storyboarding: tools and techniques</td>
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<tr>
<td><strong>Requirements discovery</strong> §11-12(Alexander et al. 2009)</td>
<td>Discuss requirements discovery</td>
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<tr>
<td><strong>Requirements management</strong> §7(Berenbach et al. 2009)</td>
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<td></td>
<td>Open source requirements practices</td>
</tr>
<tr>
<td><strong>Qualities &amp; measures</strong> §6,9 (Alexander et al. 2009)</td>
<td>Specify software qualities &amp; measures</td>
<td></td>
</tr>
<tr>
<td><strong>Workflows</strong> §5(Bridgeland et al. 2009); scan (i.e., be aware of): §4-4.4(Graham 2008)</td>
<td>Specify system workflows</td>
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<tr>
<td></td>
<td></td>
<td>Business activity monitoring</td>
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<tr>
<td><strong>Domain modeling I</strong> §8,13(Alexander et al. 2009); §3-4(Chonoles et al. 2003)</td>
<td>Specify a simple domain model</td>
<td>Milestone 2</td>
</tr>
<tr>
<td><strong>Domain modeling II</strong> §5-6(Chonoles et al. 2003); §5(Ambler 2005)</td>
<td>Specify an advanced domain model</td>
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<tr>
<td></td>
<td></td>
<td>Prioritizing requirements</td>
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<tr>
<td><strong>Final Presentations</strong></td>
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<tr>
<td><strong>Exam Review</strong></td>
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<tr>
<td><strong>Exam 2</strong></td>
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</table>

Topics are presented by students, but the paper is due the last week of classes.
5 Readings by Session

Readings provide content for class discussions. Thus, readings must be read prior the class. For example, session 1 readings must be read prior to class on session 1.

1. **Software Requirements** (Goldstein 2005); (Charette 2005); §1(Alexander et al. 2009)
2. **Vision document** §6(Zielczynski 2008)
3. **Stakeholder & goals** §2-3 (Alexander et al. 2009); §7(Lamsweerde 2008)
4. **Context & scenarios** §4-5 (Alexander et al. 2009); §8-9(Chonoles et al. 2003); **Use cases** §5(Ambler 2004); §12(Chonoles et al. 2003)
5. **Requirements discovery** §11-12(Alexander et al. 2009)
6. **Requirements management** §7(Berenbach et al. 2009)
7. None (Exam 1)
8. **Storyboarding** §10-11(Harton et al. 2012); (Kelly 2007)
9. **Qualities & measures** §6,9 (Alexander et al. 2009)
10. **Workflows** §5(Bridgeland et al. 2009); **scan** (i.e., be aware of): §4-4.4(Graham 2008)
11. **Domain modeling I** §8,13(Alexander et al. 2009); §3-4(Chonoles et al. 2003)
12. **Domain modeling II** §5-6(Chonoles et al. 2003); §5(Ambler 2005)
13. None (final presentations)
14. None (Exam 2)

5.1 References

Students should have access to the primary textbook (Alexander et al. 2009); see the bookstore or access online at E-book from Books24x7 (for free):

**Primary Textbook:** *Discovering Requirements: How to Specify Products and Services,* Ian Alexander, Ljerka Beus-Dukic, 2009.

Below, books can be accessed from E-book from Books24x7. Articles have a URL, which can be used to download the article. (This assumes that you are on the university network directly or VPN. You may be prompted for your campus ID and password.) Gartner articles can be access through GSU's Gartner Access link—search for the article name or ID. Some articles may be only available from our web site.

To find other articles, use the method described in section 10 How to Scan CIS Literature.

**Readings**

9. Goldstein, H. "Who killed the virtual case file?," IEEE SPECTRUM (42:9) 2005, p 18. [http://dx.doi.org.ezproxy.gsu.edu/10.1109/MSPEC.2005.1502526](http://dx.doi.org.ezproxy.gsu.edu/10.1109/MSPEC.2005.1502526)
5.2 E-book from Books24x7

Consider the E-books as good resource; they are free to our students. See this note: http://www2.cis.gsu.edu/cis/news/newandnoteworthy2.asp Access from the GSU online library: http://homer.gsu.edu/search/databases/proxy/GLL25038; select the link Books24x7. You can also scroll down to Books 24x7 in the list of “databases”: http://homer.gsu.edu/search/databases/alphabetical#B

5.3 Software

Additionally, much of the software is available for download, either from the instructor, or from the CIS agreements with DreamSpark and the IBM Academic Initiative.

6 In-Class Exercises

Each exercise is intended as a group effort, which illustrates important concepts introduced in the associated readings. More detailed exercise description and associated materials shall be found on the course web site.

- **Deliver** your in-class results to the course web site during class (only). There shall be a folder area for your submission.
  - Authors shall receive credit for each in-class exercise.
  - Prominently (at the top) of the delivered document, place the names of authors.
  - Do not include the name of anyone who is absent or did not contribute. Doing so will result in zero credit for all ‘authors’.
  - Late deliverables (after class) shall receive zero credit.
7 Homework

7.1 Requirements Specification

Small teams (3 people) shall specify and analyze a small information systems project. Teams will specify and analyze an information system using a CASE tool.

1. Select a specification problem from your workplace, or from the web site.
   a. The scope and sophistication of your production specification can vary substantially.

2. Obtain project approval from the instructor.

3. Apply the milestone templates, available from web site. (Please note that the Classic RUP Lifecycle is much larger, and also available; it includes downloadable (required) Word templates and examples—see the web site.
   a. The project must be formatted exactly as specified in the assignment and templates.

4. For each milestone, deliver via email:
   ✓ A single file (zip if large) containing
     o Requirements artifacts as specified in the assignment description (see the web site)
     o Summarize group work:
       • Tasks completed by each member
       • Percentage of the total work completed by each member
   ✓ Your Personal Statement
     o Each team member must a confidential personal statement (maximum of one page per member) highlighting
       • His or her contribution to the project
       • Comments on the contribution of other group members
7.2 Requirements Specification (M3) Presentation

These presentations will take place during the last week of the term. **Attendance is mandatory for all student final project presentations.** (Failure to present may result in a zero grade for your project. Failure to attend may result in a 50% reduction of your M3 project points.) Each presentation will last about 10-15 minutes (depending on the size of the class). Note: this is a very short time, so be prepared to be concise.

- **External reviewers, from local companies, may be in the audience.** This is not the time to air complaints about the class, your classmates, or downplay the strengths of your work. This is the time to show fruit of your semester’s labor.

Your creative efforts should be realized within the following format:

- **Teamwork (1 minute)**
  Introduce your team members. *Briefly* describe their contributions.

- **System Requirements (2 mins)**
  What problems are solved by your system. *Get to it the point!* Show perceived problems or system requirements as bulleted points. Introduce system goals. Consider a few slides as follows:
  1. Problem domain (e.g., scheduling pilots for flight)
  2. Goals

- **Broad-Brush Outline of the Proposed System (2 mins)**
  Explain the focus of your modeling efforts. Show UML class models and use cases along with their requirements. (What parts of CRUD does your module do? For which classes?) Consider a few slides as follows:
  1. Trace matrix
  2. Zoom in on one or a few goals

- **System Analysis & Demonstration (7 mins)** Generally, it's best to show at least one vertical "slice" of the system: that is, trace the logic from a abstract level to more concrete levels (e.g., goals, workflow, use case, scenarios, domain model). Repeat for other aspects in more detail if you have time. Briefly, explain your analysis, which ensured that your model is correct. Clearly, explain any design decisions that you made.

Overview any aspects for which you do not have time to detail. Consider a few slides as follows:

  1. Workflow diagram
  2. Use case diagram
  3. One use case
  4. Storyboard
5. Domain model (zoom in on classes that support the use case)
6. If time remains, consider another use case and then its classes from the domain model

- Conclusion (1 mins) Try to answer questions that purchasers (IT executives) might have: Why is your module necessary? How can it work with other modules? Can the project be extended? What are the next phases of development for this project?
- Open Floor
  Finally, the presenting team will respond to questions from the class. Your instructor will moderate the time remaining.

### 7.2 Special topic

Small teams (2 or 3 people) will describe concept, method, or tool. (Typically, this is the same group as for the requirements specification project.)

- a paper
- a PowerPoint presentation summary (10 - 25 slides)

#### 7.2.1 Select a special topic

Determine your preference for three (3) presentation topics. Email your choices early! First comes, first served. **Only one email per group please.**

**Reviewing requirements**

A requirements specification must be checked for problems. A single person may check for simple format and content issues. Describe some common checklists used in reviews.

**Keywords**

- Software requirements, checklist, review

**Starting links**

- Consider references in the Readings by section.
- Review checklists found in requirements books on GSU's E-Books24x7, such as these references (in 1):  
  - (Ambler 2005)

**Requirements workshops**

A requirements specification must be checked for problems. A group may review the specification based on their own expertise and organization role (i.e., manager, developer, customer). Describe some common methods by which groups review requirements in workshops.

**Keywords**

- Software requirements workshop, review

**Starting links**

- Consider references in the Readings by section.
- Review checklists found in requirements books on GSU's E-Books24x7, such as Alexander, I., and Maiden, N. Scenarios, stories, use cases: through the systems development life-cycle Wiley, 2004  

**Open source requirements practices**

The open-source development is an agile, distributed approach with tool support. Requirements are informal. Describe the forms of requirements and how they are managed.

**Keywords**

- open source, requirements, management, requests, bugs, work item
  
- Search for articles by author: W Scacchi, e.g., Understanding the requirements for developing open source software

**Starting links**

- [http://www.jazz.net](http://www.jazz.net)
- [http://www.redmine.org/](http://www.redmine.org/)
The good and bad of: textual requirements and requirements document structures

Many requirements are specified using simple text (i.e. natural language). The sentence form of each requirement affects how people understand them. Similarly, the standardized structure of a (large) requirements document affects the usefulness of the requirements. Describe good and bad guidelines for writing and structure textual requirements. (Note that all IEEE document, including standards, are available through our library’s IEEE database.)

Keywords
- Textual requirements, style, format, structure, IEEE document standards, template

Starting links
- Chapter 6 - Developing a Vision Document, Requirements Management Using IBM Rational RequisitePro
- Note: many of the UML books on GSU's E-Books24x7 have a document template in the appendix.

Effort estimation with use cases

Use cases or user stories are among the first requirements specified. Some tentative estimates can be made from them to aid planning. Find out how.

Keywords
- Effort estimation, planning, story point, use cases, user stories

Starting links
- [http://www.agilemodeling.com/artifacts/userStory.htm](http://www.agilemodeling.com/artifacts/userStory.htm)
- [Dear Dr. Use Case: What About Function Points and Use Cases?](http://csse.usc.edu/csse/research/AgileCOCOMO/)
- [http://csse.usc.edu/csse/research/AgileCOCOMO/](http://csse.usc.edu/csse/research/AgileCOCOMO/)

Scrum planning: concepts and tools

Scrum is a kind of agile development practice. Its planning practices consider multiple releases, each consisting of multiple milestones (or sprints). Describe this planning approach and related tools and techniques (e.g., IBM Jazz work item and planning).

Keywords
- Scrum, planning, sprint, story point, agile, backlog, burndown

Starting links
- [http://jazz.net/library/](http://jazz.net/library/)
  - Get a free id and search the library
  - See the video: Using the Scrum Process and Agile Estimating and Planning with Rational Team Concert

Business activity monitoring

The real-time analysis of business processing has been touted by Gartner, Inc, as a central area of strategic growth for organizations. Goals, objective, requirements—some performance measure must be specified before it can be monitored. Thus, requirements specification and BAM are related. Describe BAM and its relationships to systems analysis and requirements specification. Illustrate the concepts with demos (screen images, videos, or live demos are on the web).

Keywords
- Business activity monitoring, BAM, key performance indicators, KPI, business dashboard Starting links
Animated storyboarding: tools and techniques

Storyboards show the screens a user will see as the software asks for inputs and presents results. In so doing, they provide concrete context for understanding requirements. Go beyond the introduction to storyboarding that is provided in this course by describing how advance tool can simulate storyboarding—in particular, consider IBM Rational Requirements Composer, and iRise.

Keywords
- Storyboarding, prototype, simulation, iRise, IBM Rational Requirements Composer

Starting links
- Software Requirements, Second Edition

UML, ERD, database schema, and data

Data is modeled with the UML class diagram and the entity relationship diagram. Both of these diagrams provide a logical models, which can be realized as a physical, relational-database schema. Once a database is created from the database schema, data can be managed (e.g., added & deleted) from the database. What are the important differences between the UML class diagram and ERD? Why use one instead of the other? Provide an illustrative example to compare the modeling approaches. Illustrate a simple (2 entities with 1 relationship) data model (class diagram, ERD), database schema, and data.

Keywords
- UML, ERD, class diagram, database schema, transformation

Starting links
- http://www.agiledata.org/essays.umlDataModelingProfile.html

Systems Analysis and Requirements management careers

Specifying and analyzing software systems is a rewarding career. Present job descriptions and describe daily work for people with beginning, intermediate, and advanced skills in systems analysis. Present real-world examples (e.g., from Monster.com, Dice.com) along with market forecasts on the growth of this career field. Consider the value, if any, of related certifications (e.g. Cisco network engineer, International Institute of Business Analysis, IBM, etc.)

Keywords
- Systems Analysis, Requirements management, careers,

Starting links

Business Process Simulation

Business processes are often described in terms of their workflow, which can be represented using BPMN or UML's activity diagram (and extensions). Such models can be simulated to determine anticipated qualities of implemented software processes. Vendors such as IBM and Tibco provide software for simulating business processes that are represented in BPMN. Present a business workflow and show how it can be simulated, along with the effort required and the benefits of simulation.
Keywords
- Workflow simulation, BPMN, activity diagram, Tibco, IBM Business Process Modeler

Starting links

Requirements traceability
The success of some requirements depend on other requirements. In fact, there are many dependencies among the requirements and other development artifacts, such as stakeholder statements, various documents, and software code. Describe requirements traceability and how it is used to discover conflicts that arise during project development, as well as other requirements traceability analyses.

Keywords
- Requirements traceability, suspect, meta-model

Starting links
- §13 E-Book: Jag Sodhi and Prince Sodhi, Managing IT Systems Requirements, 2003

Prioritizing requirements
Some requirements are more important. Present techniques showing how requirements can they be systematically placed in some order of preference according to users. Often, costs and risks (of various kinds) drive users to rank some requirements higher. Consider such factors that lead users to their ranking.

Keywords
- Software requirements, priorities, preferences, trade-offs, weights, value, risk, cost

Starting links
- §10,14 (Alexander et al. 2009)

7.2.2 Topic article
Your class peers are the intended audience for this article. They are among the best IT managers, engineers, and scientists. The will want to know the details of the method you describe, as well as "why do I care?"

In describing your topic, please consider the following aspects:
- Answer questions of what, why, when, where, how, and who.
- Describe both theory and computer tool support.
- Describe implications for practitioners, i.e., does the method really help?
- Include at least four academic references (peer-reviewed articles) in your research.
- Do not summarize (substantially) the course materials; assume them as background and add new materials.
- Write the article using the wikipedia.org style (meaning, a short, to the point, encyclopedia description).
- Your article will be posted (by the instructor) on our course web page as a Blog article—it will visible on the WWW.
- Relate the topic material to the course materials

Ensure that your article:
- Style, grammar, and spell checked (in Word)
- Minimum of 2,400 words; about 5 pages (single spaced)
  - figures, tables, and references do not included in page count
  - Liberal use of quotations are allowed; however, the sources must be referenced. No more than 20 percent of the paper word count can be quotations
Systems Analysis Syllabus

- References to articles using a standard format (e.g., Chicago); see EndNote.

Include appropriate web links and article references using EndNote; See How to Scan CIS Literature. • Deliver your article to the instructor as an email attachment
  o The article must be a Word document. Ensure that it is spell and grammar checked.

7.2.3 Topic presentation

- Deliver a PowerPoint presentation of your topic on the scheduled date
  o You will have about 15 minutes, depending on class size
- Deliver your PowerPoint slides to our web site

7.2.3.1 Presentation Guidelines

The project presentation should reflect your article. Be prepared to setup, present, and leave the presentation areas within the allotted time, depending on the number and type of presentations. Poorly prepared groups will find they must end their presentation before getting to their most important points.

Consider the following structure for your presentation:
1. Introduction
2. 1 Summary
3. < topic 1 details> ...
4. Take Away Points (1 – 3)
5. 2 Summary
6. < topic 2 details> ...
7. Take Away Points (1 – 3)
8. ...
9. Bibliography

Presentations shall be professional, of course—minimally, PowerPoint sides.

8 Examinations

Online review guides to be updated one-half week prior to the exam.

8.1 Exam 1

See the online exam review for a description.

8.2 Exam 2

Comprehensive! See the online exam review for a description.

9 How to Scan CIS Literature

9.1 Software

Install EndNote:
1. Free EndNote @ GSU

9.2 Literature Review

Search for peer reviewed articles using keywords:
2. Scan the web
   a. www.google.com
3. Scan the web using scholar search engines
      i. Set the Google Scholar Preferences to
2. Show library access links for Georgia State University
2. Show links to import citations into EndNote
   c. http://citeseer.ist.psu.edu/
4. Scan using library databases (@GSU)
   a. http://www.galileo.usg.edu/
   b. In particular, the following databases
      i. ABI/INFORM Complete
      ii. ACM Digital Library
      iii. IEEE Xplore