SYLLABUS: CSC 404 - Software Design and Development I

COURSE DESCRIPTION

Introduction to Software Design paradigms, Project Management, System and Software Requirements, Computer Aided Software Engineering, and Software Design Fundamentals using existing documentation for a proposed system. In-depth survey of data flow-oriented, object-oriented, data-oriented, and real-time design. Team project involving the implementation of the proposed system using structured programming, information hiding, and strength and coupling measures. Software reviews. Software testing techniques and strategies. Software maintenance. Each student will be required to make an oral presentation as part of the team project.

PREREQUISITE: CSC 308 or Permission of Instructor

TEXTS (you will need all texts)

- IBM Rational Material (Available from Mr. Willis)
  - Redbooks
  - Rational Software Architecture/Eclipse

Links and References

- [http://umlcenter.visual-paradigm.com/](http://umlcenter.visual-paradigm.com/)
- Information Assurance Readings and Links
  - Information pertaining references are posted [here](#). Texts will be on reserve, papers will be accessible on the course blackboard site.
  - If you find that any of the links are not functional, please inform me immediately.
  - Required readings will be assigned per class progress and major project development. Remember that your project [must](#) contain documentation and implementation proof that the items found in [here](#) are implemented. Your examinations will also Information Assurance questions.

INSTRUCTOR

- Robert A. Willis Jr.
OFFICE HOURS

<table>
<thead>
<tr>
<th>Days</th>
<th>Times</th>
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<tbody>
<tr>
<td>M W F</td>
<td>9:00 – 11:00</td>
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<td>T Th</td>
<td>2:00 – 4:00</td>
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<td>Other times by appointment.</td>
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</table>

Telephone: 5552

E-mail: robert.willis@hamptonu.edu

COURSE OUTLINE

At the conclusion of the course you will be expected to:

- Illustrate selected software design techniques.
- Determine whether a coded module satisfies its specifications.
- Explain information hiding.
- Illustrate iterative enhancement.
- Explain cohesive, strength and coupling measures.
- Participate in a team project involving the organization, management, and the development of a large-scale software project in terms of a specific problem.

- Security planning
- Describe NSTISS Basics concerning concepts of risk management, the roles of various organizational personnel.
- Implement NSTISS Planning and Management concepts into documentation and software project.
- Orally present the results of the group work project in accordance with specifications.

MAJOR TOPICS

- The Rational™ Unified Process
- Analysis Modeling
- Generic Views
- Design Engineering
- Process Models
- Architectural Design
- Agile Development
- Component-Level Design
- Software Engineering Practice
- User Interface Design
CONDUCT OF THE COURSE

The course will be conducted during regularly scheduled class sessions. Teaching will be primarily via lecture, augmented by class discussions and homework/programming assignments. Lectures and related assignments will be made in accordance with class progress.

You will receive the results of last semester’s project. This project is approximately 50% complete. It is your responsibility for you and your team to complete the project. We will review the project and your team will also write an evaluation of the documentation, code, and executables that will be distributed.

Course Outline (Approximate)

Week One
- Introductions/preliminaries
- Visual Modeling
- The Iterative Life Cycle (to include Information Assurance topics)

Week Two
- Roles of Various Organization Personnel (Including IA personnel)
- Process: A Generic View

Week Three
- Project Discussions (Review of existing documentation)
  - Concepts of Risk Management
  - Introduction to Octave Allegro (IA Risk Management) and review of Octave Allegro usage in existing documentation.
  - Describe NSTISS Basics concerning concepts of risk management, the roles of various organizational personnel.
  - Implement NSTISS Planning and Management concepts into documentation and software project.

Week Four
- Process Models

Week Five
- Agile Development
- Examination I
Week Six
- Modeling
- Project Discussions

Week Seven
- Requirements Engineering: Scenarios: Information and Analysis Classes
- Project Discussions

Week Eight
- Requirements Modeling: Flow, Behavior, Patterns and WebApps
- Project Discussions

Week Nine
- Design Concepts

Week Ten
- Security Planning
- Examination II
- Project Discussions

Week Eleven
- Architectural Design
- Project Discussions

Week Twelve
- Component-Level Design
- Project Discussions

Week Thirteen
- User Interface Design
- Project Discussions

Week Fourteen
- Web App Design
- Review

Week Fifteen
- System Delivery
HOMEWORK/ PROJECT ASSIGNMENTS

Assignments that are turned in late because of an excused absence will receive full credit for the quality of work done in accordance with the grading schedule. Assignments that are turned in late because of an unexcused absence will be downgraded accordingly (one letter grade per class period). Assignments will not be accepted after I have graded and returned them. Due dates for assignments will be established when they are distributed. All assignments are to be turned in at the beginning of the class period. Projects will account for 45% of your overall grade.

EXAMINATIONS AND GRADING

There will be three examinations administered during the course. These exercises will cover the following chapters and supplemental materials as indicated below:

| Examination I. | 10 points. | Topics, Chapters 1 – 4 | October 8, 2009 |
| Examination II. | 10 points. | Topics, Chapters 5 – 8 | November 12, 2009 |
| Examination III. | 15 points. | Chapters 9 – 11 and 13 | December 14, 2009 @ 1:00 pm |
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| |
| You must take the examination at this time. |

GRADING

The following information applies to all students in the School of Science:

In addition to the minimum grade requirements established by Hampton University, all majors within the School of Science must pass all required courses offered within the School of Science with a grade of “C” or better in order to satisfy degree requirements. The minimum grade requirement is in effect for all science courses taken during Fall 2001 and beyond.

Grading will be determined based on examinations, homework and your project. Grades for this course are awarded in accordance with the following Hampton University grading schedule:

| 98 - 100 A + | 94 - 97 A |
| 90 - 93 A - | 88 - 89 B + |
| 84 - 87 B | 80 - 83 B - |
| 78 - 79 C + | 74 - 77 C |
| 70 - 73 C - | 68 - 69 D + |
| 64 - 67 D | 60 - 63 D - |
| BELOW 60 F |

1 Distribute and discuss sample examinations.
GRADING RE-CAPITULATION

Grading for the course will be determined based on the following categories with related values:

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Examinations</td>
<td>35%</td>
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<tr>
<td>Projects</td>
<td>45%</td>
</tr>
<tr>
<td>Individual Assignments</td>
<td>20%</td>
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</tbody>
</table>

HONOR SYSTEM

You are expected to do your own work. If you have problems see me or other designated persons. If your work can be reasonably construed to be other than your own, you will receive at worst a zero grade for that assignment.

Please read Hampton University’s Code of Conduct that can be found on pages 13 and 14 of the student handbook. Items 5 and 8 (respectively) are reproduced below. You are expected:

- To practice personal, professional, and academic integrity, and to discourage all forms of dishonesty, plagiarism, deceit, and disloyalty to the code of conduct.
- Personal, professional, and academic integrity is paramount to the survival and potential of the Hampton Family. Therefore, individuals found in violation of Hampton University’s policies against lying, cheating, plagiarism, or stealing are subject to disciplinary action that could possibly include dismissal from the University.
- To be fully responsible of upholding the Hampton Code.
- Each member of the Hampton Family will embrace all tenets of the Code and report all code violators.

ATTENDANCE

Hampton University’s attendance policy will be observed, which means that you are expected to attend all classes as scheduled. You are responsible for any assignments, deliveries, and class discussions at all times. I will take attendance at the beginning of each class period. If you are not present for the roll call, attendance points will be deducted from your grade. I will not tolerate habitual tardiness; it is disruptive and unfair to your fellow students.

GRADING DETAILS

The grading in this course will be based on 1000 possible points for each student. Points will be given for both individual work and work done in a group. The points possible in these categories are given below:
INDIVIDUAL ASSIGNMENTS: 200 POINTS

- Resume and cover letter: 50 points
- Ethics assignment: 50 points
- ACT Online (act-online.net) 100 points
  - Business Information Continuity Module
    - October 12, 2009
  - Information Risk Management Module
    - November 30, 2009

EXAMINATION I: 100 POINTS

EXAMINATION II: 100 POINTS

EXAMINATION III: 150 POINTS

GROUP WORK: 450 POINTS

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<tr>
<th>Exp/Plan</th>
<th>Iter. 2</th>
<th>Iter. 3</th>
<th>Iter. 4</th>
<th>Iter. 5</th>
<th>Orals</th>
<th>Final</th>
<th>Points</th>
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<td>26-Oct</td>
<td>9-Nov</td>
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<td>8-Dec</td>
<td>10-Dec</td>
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All iterations will include Octave Allegro and Information Assurance documentation and subsequent progress reports.

You will use Rational Software Architect for all documentation.

Each student will actively participate in group oral presentations. All written assignments must be typed. Spelling grammar and layout are always part of the evaluation process for written assignments.

WRITING-ACROSS-THE-CURRICULUM

Writing across the curriculum objectives will be achieved through the following course assignments:

- Resume and cover letter.
- Critique and Explanation of existing project documentation.
- All new project documentation developed this semester.
RESUME ASSIGNMENT

I am a manager of a software development company called "Hampton Computing," located at 18 Chip Lane, Hampton, Va. 23664. You are applying for a part-time programming position.

Write a one-page resume that includes at least the following information:

- Name,
- Home address and home telephone,
- Office address and telephone (if applicable),
- Schooling,
- Programming experience (including languages you know),
- And any familiarity you have with software engineering and web development principles.

This assignment must be typed. It is worth 50 points of the 1000 points possible for the course. Hand in two copies of the cover letter and resume. Staple one cover letter to each resume. The cover letter should provide some rationale for me to hire you. One copy will be returned to you, and the other will be retained in your Hampton Computing file.

Due Date:

- September 11, 2009
  - Close of business (Hard copy).
  - Grading will be based on spelling, grammar, and layout as well as how accurately you have followed the instructions.

The University Mission Statement & Activities

<table>
<thead>
<tr>
<th>Areas</th>
<th>Activities</th>
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<tbody>
<tr>
<td>Development of Character</td>
<td>Learning Process, Homework / Programming Assignment</td>
</tr>
<tr>
<td>Leadership</td>
<td>In-class Activities</td>
</tr>
<tr>
<td>Scientific Emphasis</td>
<td>Algorithm Analysis</td>
</tr>
<tr>
<td>Professional Emphasis</td>
<td>Software Development, Documentation, Punctuation</td>
</tr>
<tr>
<td>Research</td>
<td>Ethics paper, Algorithm Analysis</td>
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<tr>
<td>Service</td>
<td>ACM tutorial sessions</td>
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<tr>
<td>Strong Liberal Arts Undergirding</td>
<td>Miscellaneous discussions of the relationship of liberal arts to computer science.</td>
</tr>
<tr>
<td>Multi-Culturalism</td>
<td>Need for computer scientists to understand in interact with other cultures</td>
</tr>
<tr>
<td>Holistic Education</td>
<td>Need for computer scientists to understand the synergism of the sum of all educational aspects.</td>
</tr>
</tbody>
</table>
Disclaimer

This syllabus is intended to give the student guidance in what may be covered during the semester and will be followed as closely as possible. However, the professor reserves the right to modify, supplement and make changes as course needs arise.

Hampton University Scoring Rubric

The Hampton University Advisory Council of the Writing Program has approved and recommended the use of the scoring rubric as a guide for evaluating student-writing performance across the curriculum.

6 A paper in this category:

- States purpose (e.g., position or thesis) insightfully, clearly and effectively
- Provides thorough, significant development with substantial depth and persuasively marshals support for position
- Demonstrates a focused, coherent, and logical pattern of organization
- Displays a high level of audience awareness
- Uses disciplinary facts critically and effectively
- Has superior control of diction, sentence structure, and syntactic variety, but may have a few minor flaws in grammar, usage, punctuation, or spelling
- Documents sources consistently and correctly using a style appropriate to the discipline

5 A paper in this category:

- States purpose (e.g., position or thesis) clearly and effectively
- Provides development with some depth and complexity of thought and supports position convincingly
- Demonstrates an effective pattern of organization
- Displays a clear sense of audience awareness
- Uses disciplinary facts effectively
- Has good control of diction, sentence structure, and syntactic variety, but may have a few minor errors in grammar, usage, punctuation or spelling
- Documents sources correctly using a style appropriate to the discipline

4 A paper in this category:

- States purpose (e.g., position or thesis) adequately
- Provides competent development with little evidence of complexity of thought
- Demonstrates an adequate pattern of organization
- Displays some degree of audience awareness
- Uses disciplinary facts adequately
- Has adequate control of diction, sentence structure, and syntactic variety, but may have some errors in grammar, usage, punctuation, or spelling
- Documents sources adequately using a style appropriate to the discipline
3 A paper in this category:

- States purpose (e.g., position or thesis) but with varying degrees of clarity
- Provides some development for most ideas
- Demonstrates some pattern of organization, but with some lapses from that pattern
- Displays uneven audience awareness
- Uses some disciplinary facts
- Has some control of diction, sentence structure, and syntactic variety, but may have frequent errors in grammar, usage punctuation, or spelling
- Documents sources using a style appropriate to the discipline, but may have errors

2 A paper in this category:

- States purpose (e.g., position or thesis) unclearly
- Provides inadequate development of thesis
- Demonstrates inconsistent pattern of organization
- Displays very little audience awareness
- Uses disciplinary facts ineffectively
- Has little control of diction, sentence structure, and syntactic variety, and may have a pattern of errors in grammar, usage, punctuation, or spelling
- Acknowledges sources but does not document them using a style appropriate to the discipline

1 A paper in this category:

- Fails to state purpose (e.g., position or thesis)
- Fails to develop most ideas
- Lacks a pattern of organization
- Displays no audience awareness
- Uses few or no disciplinary facts
- Lacks control of diction, sentence structure, and syntactic variety, with a pattern of errors in grammar, usage, punctuation, or spelling
- Fails to document or acknowledge sources
Throughout the course the following Information Assurance concepts will be incorporated into the class. It is expected that all documentation (UML and Requisite Pro) will contain relevant and complete sections devoted to Information Assurance. These issues will also be implemented into the software product.

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<tr>
<td><strong>D. NSTISS Basics (Awareness Level)</strong></td>
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<tr>
<td><strong>Topical Content</strong></td>
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<tr>
<td><strong>e Concepts of Risk Management:</strong></td>
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<tr>
<td>* cost/benefit analysis of controls</td>
<td>Suppl. Mat.</td>
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<tr>
<td>* implementation of cost-effective controls</td>
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<td>* consequences (e.g., corrective action, risk assessment)</td>
<td>Suppl. Mat.</td>
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<tr>
<td>* monitoring the efficiency and effectiveness of controls (e.g., unauthorized or inadvertent disclosure of information)</td>
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<tr>
<td><strong>f Concepts of System Life Cycle Management:</strong></td>
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<tr>
<td>* requirements definition (e.g., architecture)</td>
<td>Pressman Ch. 2</td>
<td>Suppl. Mat.</td>
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<tr>
<td>* development</td>
<td>Pressman Ch. 2</td>
<td>Suppl. Mat.</td>
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<tr>
<td>* demonstration and validation (testing)</td>
<td>Pressman Ch. 2</td>
<td>Suppl. Mat.</td>
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<tr>
<td>* implementation</td>
<td>Pressman Ch. 2</td>
<td>Suppl. Mat.</td>
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<tr>
<td>* security (e.g., certification and accreditation)</td>
<td>Pressman Ch. 2</td>
<td>Suppl. Mat.</td>
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<tr>
<td>* operations and maintenance (e.g., configuration management)</td>
<td>Pressman Ch. 2</td>
<td>Suppl. Mat.</td>
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<tr>
<td><strong>i Roles of Various Organizational Personnel</strong></td>
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<td>*</td>
<td>senior management</td>
<td>Suppl. Mat.</td>
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<td>program or functional managers</td>
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<td>*</td>
<td>system manager and system staff</td>
<td>Suppl. Mat.</td>
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<td>*</td>
<td>telecommunications office and staff</td>
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<td>*</td>
<td>security office</td>
<td>Suppl. Mat.</td>
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<tr>
<td>*</td>
<td>COMSEC custodian</td>
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<td>INFOSEC Officer</td>
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<td>information resources management staff</td>
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<td>*</td>
<td>audit office</td>
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<td>OPSEC managers</td>
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<td>end users</td>
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**F. NSTISS Planning and Management (Performance Level)**

**Instructional/Behavioral Content**

**a. Discuss practical performance measures employed in designing security measures and programs**

* Builds a security plan that encompasses NSTISS components in designing protection/security for an instructor-supplied description of an AIS telecommunications system.


**b. Introduce generic security planning guidelines/documents**

Pressman Ch. 2  Suppl. Mat.  

**Topical Content**

**a. Security Planning**

* directives and procedures for NSTISS policy


* NSTISS program budget


* NSTISS program evaluation

Pressman Ch. 2  Suppl. Mat.  

* NSTISS training (content and audience definition)

Pressman Ch. 2  Suppl. Mat.  

**b. Risk Management**

* information identification

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<tr>
<th></th>
<th>Roles and Responsibilities of All the Players in the Risk Analysis Process</th>
<th>Suppl. Mat</th>
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<tr>
<td></td>
<td>Risk Analysis and/or Vulnerability Assessment Components</td>
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<td>Risk Analysis Results Evaluation</td>
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<td>Corrective Actions</td>
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<td>Acceptance of Risk (Accreditation)</td>
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<td>C</td>
<td>Systems Life Cycle Management</td>
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<td></td>
<td>Management Control Process (Ensure that appropriate administrative, physical, and technical safeguards are incorporated into all new applications and into significant modifications to existing applications)</td>
<td>Pressman Ch. 2</td>
<td>NIST Special Publication 800-35 Guide to Information Technology Security Services</td>
<td>NIST Special Publication 800-64: Security Considerations in the Information System Development Life Cycle</td>
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<td>Evaluation of Sensitivity of the Application Based Upon Risk Analysis - Determination of Security Specifications</td>
<td>Pressman Ch. 2</td>
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<td></td>
<td>Design Review and Systems Test Performance (Ensure required safeguards are operationally adequate)</td>
<td>Pressman Ch. 2</td>
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<td></td>
<td>Systems Certification and Accreditation Process</td>
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<td></td>
<td>Acquisition</td>
<td>Pressman Ch. 2</td>
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