SSW-565: Software Architecture and Component-Based Design

Professor Name: Robbie Cohen  
Office address: 404 Altorfer  
Office phone number: 201 216-8561  
E-mail address: rcohen2@stevens.edu

Email is always the best way to contact me!

Office Hours: TBD and by appointment

Course Web Address: http://www.stevens.edu/Moodle

Overview

This course provides the student with a working knowledge of the terms, principles and methods of Software Architecture and Component-Based Design, introducing students to a wide variety of processes and alternatives that can be deployed in creating and/or evaluating software architectures and designs. Numerous case studies of working software architectures are studies and the student will acquire an appreciation of the role that software architecture and design activities play in the acquisition and/or development of complex software-intensive systems.

Special consideration is given to the role of architecture and design in software assurance for dependability, including performance, reliability and security. Recent advances in design techniques, software patterns, component based design and design refactoring are introduced.

Prerequisites

SSW 540 or equivalent experience

Learning Goals

After taking this course, the student will be able to:

- Construct an architecture using the "4+1" model, emphasizing architectural styles and nonfunctional requirements
- Base software design on components, patterns and classes using a domain driven approach
- Re-factor code to improve understanding or modification
- Apply a continuous learning approach to software architecture and design
Pedagogy

The course includes texts and readings drawn from the current academic literature on software architecture and design, and lectures/discussions that present and synthesize that literature. Numerous example software architectures are used to illustrate the principles discussed in class. The course focuses on fundamental software architectural concepts and issues, as well as various design techniques including Domain Design. Students are encouraged to draw from their current and prior work experiences and relate those experiences to the principles discussed in class. Students are required to keep a log that relates their course study to current architectural and design issues arising in their other classes, at work or in their general reading.

Class Participation - To enhance the learning experience, all students are expected to participate in class discussions, conducted as online Forums for webCampus students. Class participation is an essential component of the course. Please let the professor know, in advance, if you will be unable to meet your course responsibilities in any given week.

Texts

Required


Recommended, but not required


Required Readings

Most weeks, assigned readings include 1 or more chapters from a text plus 1 or more journal articles found as resources on the course Moodle site. Students are expected to have completed the assigned reading BEFORE attending a live or recorded lecture event each week.
Assignments

- **Assigned readings** are listed on the course schedule for each week. For web campus students, each week begins on Monday with the posting of lecture slides and/or notes for the week.
- **Quizzes** or **assigned written work** should be submitted by noon, Eastern time, on Thursday of the week when due.
- **Logbooks** relating the principles learned in this course to each student’s software experiences should be kept and updated at least weekly. There should be at least 13 dated entries in the log, one for each week of class. Logs will be collected before the 14th week of class, and individual assignments, entered in the logs may be collected earlier.
- There will be a single **examination** covering all of the course material at the end of the course.

Grading

Grades will be based on the following distribution of credits:

1. Class and Discussion Forum participation 20%
2. Written Assignments and Quizzes, if any 35%
3. Logbook 15%
4. Open book Examination 30%

**TOTAL** 100%

Final grades will be awarded in accordance with the following scale:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>93 - 100</td>
</tr>
<tr>
<td>A-</td>
<td>90-92</td>
</tr>
<tr>
<td>B+</td>
<td>87 - 89</td>
</tr>
<tr>
<td>B</td>
<td>83-86</td>
</tr>
<tr>
<td>B-</td>
<td>80-82</td>
</tr>
<tr>
<td>C</td>
<td>70 – 79</td>
</tr>
<tr>
<td>F</td>
<td>&lt;70</td>
</tr>
</tbody>
</table>

See the **Course Schedule** for reading and other assignments by week.
## SSW 565 Course Schedule for Topics, Readings and Assignments

<table>
<thead>
<tr>
<th>Wk</th>
<th>Topic</th>
<th>Reading Assignments</th>
<th>Written Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>BA&lt;sup&gt;1&lt;/sup&gt;</td>
<td>DDD&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>1</td>
<td>What is Software Architecture</td>
<td>1</td>
<td>Perry &amp; Wolf&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>2</td>
<td>Styles &amp; Frameworks</td>
<td>2</td>
<td>Garlan &amp; Shaw&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>3</td>
<td>Building Blocks</td>
<td>6</td>
<td>Kruchten&lt;sup&gt;c&lt;/sup&gt; Mitra&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>4</td>
<td>Architecturally Significant Requirements</td>
<td>4</td>
<td>1 - 3, + p 507-510</td>
</tr>
<tr>
<td>5</td>
<td>Component Based Design</td>
<td>4 - 6</td>
<td>ASRs</td>
</tr>
<tr>
<td>6</td>
<td>NFRs</td>
<td>3, 7, 8</td>
<td>Sha&lt;sup&gt;e&lt;/sup&gt;</td>
</tr>
<tr>
<td>7</td>
<td>Designing Real Systems</td>
<td>5, 12</td>
<td>Chappell&lt;sup&gt;f&lt;/sup&gt;</td>
</tr>
<tr>
<td>8</td>
<td>Architecture Evaluation</td>
<td>7 - 9</td>
<td>Maranzano&lt;sup&gt;g&lt;/sup&gt;</td>
</tr>
<tr>
<td>9</td>
<td>Supple Design &amp; Patterns</td>
<td>11</td>
<td>10 - 13</td>
</tr>
<tr>
<td>10</td>
<td>Strategic Architecture and Design</td>
<td>p 372 - 379</td>
<td>14</td>
</tr>
<tr>
<td>11</td>
<td>Big Architecture/Big Design</td>
<td>15 - 17</td>
<td>Evaluate a “Better design”</td>
</tr>
<tr>
<td>12</td>
<td>Additional Methods of Architecting &amp; Designing</td>
<td></td>
<td>Fairbanks&lt;sup&gt;i&lt;/sup&gt; McCabe &amp; Polen&lt;sup&gt;j&lt;/sup&gt; Hofmeister&lt;sup&gt;k&lt;/sup&gt;</td>
</tr>
<tr>
<td>13</td>
<td>Architecture &amp; Design Research</td>
<td></td>
<td>Taylor and Hoek&lt;sup&gt;l&lt;/sup&gt;</td>
</tr>
<tr>
<td>14</td>
<td>Final Exam</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Notes for Course Schedule:

1. Chapters or pages (p) in the *Beautiful Architecture* text.
2. Chapters in the *Domain-Driven Design* text.
3. Journal Articles are listed here and found on Moodle in the assigned week.


4. See Moodle for each detailed assignment.