EC500C1 Software Engineering Principles

Class Description
EC500 C1 focuses on developing product quality software. The class builds on EC601 and EC602. In the class, we will focus on software development principles, techniques and principles. We will focus on modular design concepts, product quality (testing framework, unit testing), debugging, concurrency, data flow, and API design. We will use state-of-art open source projects to learn and master different skills.

This class is designed where students prepare before class and work on the principles during the class. The class also includes a project that is assigned at the beginning and discussed every other week in the class.

The class will include:
- Analysis of public open source high-quality software projects. We will analyze and study these projects from the perspectives of:
  - Software architecture
  - Application Programing Interface (API) definition and usage
  - Test framework
  - Deployment and integration environments
- Homework that will involve
  - Development on Open Source Projects
  - Development using public or service APIs, e.g., Google, Amazon, Twitter or OpenData.Gov
- A major project that will result in a web or mobile application and/or data-analysis or machine-learning product.

Topics that we will cover:

<table>
<thead>
<tr>
<th>Week</th>
<th>Class Preparation</th>
<th>Due during Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>API Definition</td>
<td>Students will study APIs of public services and develop applications based on those APIs. This will also include critique of the APIs and developing Uber-APIs integrating two services.</td>
</tr>
<tr>
<td>Week 2</td>
<td>SW Architecture</td>
<td>Students will study open source module, detail the data usage (structures, queues, etc.), control, events and APIs.</td>
</tr>
<tr>
<td>Week 3</td>
<td>Project Sprint 1 Presentations</td>
<td>Code Review of Classmate</td>
</tr>
</tbody>
</table>
Week 4 | Use of Databases | Students will study open source projects that use databases heavily and provide reports on the use. This includes modifications to improve performance.

Week 5 | Project Sprint 2 Presentations | Code Review of Classmate projects

Week 6 | Code Reviews | The students will conduct code review exercises on public domain open source projects.

Week 7 | Project Sprint 3 Presentations | Code Review of Classmate projects

Week 8 | Development of Unit tests | Develop test scripts and unit tests to SW modules.

Week 9 | Project Sprint 4 Presentations | Code Review of Classmate projects

Week 10 | Continuous Integration | Configure student projects for continuous integration.

Week 11 | Project Sprint 5 Presentations | Code Review of Classmate projects

Week 12 | Class Project Working Sessions | 

Week 13 | Project Sprint 6 Presentations | Code Review of Classmate projects

Week 14 | Class Project Working Sessions | 

Week 15 | Final demonstrations | 

Week 16 | Report on Class Projects | 

Students will work in groups. The two main groupings will be:
- Teams of two students for In-Class Exercises.
- Teams of three for the major Project.

Students are expected to have good programming skills (Python, C/C++, Java), good understanding of object oriented programming. Prerequisites include: EC602, EC 330 or permission of the instructor.

<table>
<thead>
<tr>
<th>Item</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Sprints</td>
<td>25%</td>
</tr>
<tr>
<td>Final Project presentation</td>
<td>15%</td>
</tr>
<tr>
<td>Code Reviews</td>
<td>20%</td>
</tr>
<tr>
<td>In-class exercise</td>
<td>30%</td>
</tr>
<tr>
<td>Final Report on colleague’s project</td>
<td>10%</td>
</tr>
</tbody>
</table>