<u>Rubric</u> (Spring 2011)

Senior Project

Assessment of Student Outcomes of the BS in Computer Science
of the
School of Computing and Information Sciences
Florida International University

The School of Computing and Information Sciences evaluates the Senior Projects of its graduating seniors for the purpose of assessing the level of attainment of the Student Outcomes of the BS in Computer Science program.

Your responses to this survey will be used solely for the purpose of assessing the Student Outcomes of the BS in Computer Science program of the School of Computing and Information Sciences at FIU. This survey is expressly NOT for assessment of student performance in the SCIS Senior Project course for assignment of letter grade, nor for assessment of the instructor(s).

Rating Instructions
For each program outcome, you are provided with a check-list of 7 or more criteria that evidence attainment of that outcome. Please check all criteria that are presented in this project. You may include additional criteria that are not explicitly listed; if so, please record the additional criteria in the spaces provided. Unless noted otherwise, the number of criteria checked, <u>up to a maximum of 5</u>, should be recorded as your rating of attainment of that outcome evidenced in the project.

Project Title _____Comparative Genomics Database_____

Semester & Year _____Spring 2011_____

Faculty / Industry Sponsor: _____Dr. Giri Narasimhan_____

Evaluators: _____ Dr. Giri Narasimhan _____

_____

_____

Student Outcome *(a)*: *Demonstrate proficiency in the foundation areas of Computer Science including mathematics, discrete structures, logic and the theory of algorithms*

_____ Project incorporates elements of mathematical reasoning or proof
(**e.g.** Lemma, Theorem, Propositional Logic, First Order Logic, Mathematical Induction)

_____ Project utilizes elements of discrete mathematics
(**e.g.** Set Theory, Boolean Algebras, Combinatorics, Graph Theory)

__X__ Project utilizes some statistical procedure(s) to represent or summarize test data
(**e.g.** Mean, Standard Deviation, Stem Plot/Histogram, Box Plot/Percentile-Graph)
Deliverable 4 section 3.3: Cost of Project where we calculate the cost of project and effort distribution among developers.

__X__ Project utilizes some statistical measure(s) of system behavior or performance
(**e.g.** Probability Distributions, Confidence Intervals, Hypothesis Testing)
Deliverable 1 Appendix B – Feasibility Matrix – Hypothesis Testing is used to find out which technology to use for the development of project.

__X__ Project design utilizes finite state diagrams to model system behavior
Deliverable 2 section 4.2.3 Dynamic Model

__X__ Project utilizes some aspect(s) of formal computer science
(**e.g.** Automata, Turing Machines, Recursive Function Theory, Recursive Unsolvability)
Deliverable 2 section 4.2.3 Dynamic Model

__X__ Project utilizes some technique(s) of numerical analysis
(**e.g.**Error Estimation, Interpolation, Numerical Calculus, Linear Systems, Matrix Algebra)
Deliverable 1 – Appendix B – Feasibility Matrix

_____ OTHER: _____

_____ OTHER: _____

Student Outcome (b): *Demonstrate proficiency in various areas of Computer Science including data structures and algorithms, concepts of programming languages and computer systems.*

Data Structures & Algorithms

__X__ Project utilizes an advanced data structure, (**e.g.** search tree, hash table, priority queue)
Code of system is based on a search tree for search function.

____ Project utilizes some graph algorithm, (**e.g.** shortest path, minimum spanning tree)

__X__ Project documents runtime analysis of selected algorithms
Deliverable 3 section 3.3 in "Design of Main Algorithm."

Concepts of Programming Languages

____ Project utilizes knowledge of programming language syntax
(**e.g.** Context-Free Grammars, Parse Trees, Ambiguity, Recursive Descent)

__X__ Project utilizes knowledge of programming language semantics
(**e.g.** Natural Semantics, Interpreters, Expressions, L- and R- Value, Environments)
Coding of project uses wrappers, expressions,…etc

____ Project demonstrates familiarity with programming language design issues
(**e.g.** Scoping Rules, Dynamic Type Checking, Static Type Checking)

Computer Systems (Database)

__X__ Project utilizes or designs an appropriate database management system
Database backend with GMOD (taken care of by team 3)

__X__ Project utilizes conceptual and/or relational schema
Detailed Class Diagram in deliverable 3, section 3.2 Static Model

__X__ Project utilizes a database query language such as SQL
Database backend with GMOD (taken care of by team 3)

Computer Systems (Operating Systems)

____ Project implementation utilizes knowledge of memory management

____ Project implementation utilizes knowledge of process synchronization

____ Project documents analysis of tradeoffs in selection of system characteristics

____   OTHER: _____

____   OTHER: _____

Student Outcome *(c)*: *Demonstrate proficiency in problem solving and application of software engineering techniques.*

__X__ Project demonstrates knowledge of the Software Development Life Cycle
All deliverables with planning, research, and implementation.

__X__ Project deliverables include Project Specification
Deliverable 1: Introduction and Feasibility Study (2.2 Purpose of New System).

__X__ Project deliverables include Feasibility Study and/or Project Plan
Deliverable 1, section 2: Feasibility Study.

__X__ Project deliverables include Requirements Documentation
Deliverable 2, section 4: System Requirement.

__X__ Project deliverables include Design Documentation
Deliverable 3, section 2 and 3 (System Design and Detailed Design).

__X__ Project documents testing and/or evaluation of the implementation
Deliverable 4, section 7: System Validation.

__X__ Project incorporates system walkthroughs
See Project Guide

____ OTHER: _____

____ OTHER: _____

Student Outcome (d): *Demonstrate mastery of at least one modern programming language and proficiency in at least one other.*

__X__ Project is implemented using an appropriate high level language
Use of Java and C

__X__ Project implementation is reasonably efficient rather than "brute force"

__X__ Project implementation is modular and/or re-usable
Code and system organization is extensible (e.g. addition of new tools in the future).

__X__ Project implementation uses a modern API or Tool-Kit
Kepler as the API between UI/workflow and database.

_____ Project implementation utilizes recursion

_____ Project implementation utilizes some advanced features, e.g. polymorphism

__X__ A project sub-system or module utilizes an appropriate programming language other than the primary implementation language, e.g. SQL, ML, assembly language
Database portion of project (taken care of by team 3).

_____ OTHER: _____

_____ OTHER: _____

Student Outcome *(e)*: *Demonstrate understanding of the social and ethical concerns of the practicing computer scientist*

__X__ Project documents sources and references
   All deliverables in the last section named "References."

__X__ Project identifies and addresses any relevant social issues
   All deliverables in Introduction (Scope of System).

____ Project identifies and addresses any relevant ethical issues

__X__ Project identifies and addresses relevant legal issues
   All deliverables in Copyright section.

__X__ Project identifies and addresses any relevant privacy issues
   All deliverables in Copyright section.

__X__ Project documents anticipated impact on users/clients
   All deliverables in Introduction (Problem Definition) and deliverable 1 in Section2: Feasibility Study (Description of Current System).

__X__ Project documents and addresses any anticipated technology impact issues
   Deliverable 1 in section 2.2 Description of Alternative Solutions.

____ OTHER: _____

____ OTHER: _____

Student Outcome (f): *Demonstrate the ability to work cooperatively in teams*

__X__ Project completion evidences equitable participation by team members
Every team member worked on assigned tasks that were distributed equally among them.

__X__ Project presentation(s) included all team members
(Except presentation 3 where one the team members was sick).

__X__ Project team activity is documented
All deliverables in the Diary of Meetings appendices.

__X__ Project team set out and followed a schedule for timely completion
Deliverable 1, Appendix A – Project Schedule.

__X__ Project team negotiated consensus when needed
During Feasibility Study in "Recommendations."

__X__ Team members roles were clearly defined and executed
Deliverable 1, Section 3.1 Project Organization

__X__ Team members shared responsibility for success and failure

_____ OTHER: _____

_____ OTHER: _____

Program Outcome *(g)*: *Demonstrate effective communication skills*

__X__ Presentations described the essential features of the project
Please refer to the presentation grading sheets.

__X__ Presentations utilized good quality slides and presentation aids
Please refer to the presentation grading sheets.

__X__ Presenters utilized their time effectively
Please refer to the presentation grading sheets.

__X__ Presenters spoke directly to the audience
Please refer to the presentation grading sheets.

__X__ Technical features were communicated clearly
Please refer to the presentation grading sheets.

__X__ Project artifacts clearly document all project features
Please refer to the presentation grading sheets.

__X__ Project reports are well organized and written
Please refer to the presentation grading sheets.

_____ OTHER: _____

_____ OTHER: _____

Program Outcome (j): *Have experience with contemporary environments and tools necessary for the practice of computing*

__X__ Project utilized contemporary design tools
  Java, GMod, Kepler, StarUML, Visual Studio

__X__ Project implementation utilized a modern IDE(s)
  Java IDE, C-Sharp IDE

__X__ Project utilized appropriate validation/testing tools
  J-Unit

__X__ Project was demonstrated using appropriate presentation tools
  PowerPoint 2007

__X__ Project utilized appropriate project management tools (e.g., MS Project)
  MS Project

__X__ Project utilizes appropriate version control/document sharing tools
  Google Doc for easier access and sharing, emails.

__X__ Project documents consideration of trade-offs in selection of tools
  Deliverable 1, Section 2: Feasibility Study, section 2.6 Workflow Alternative Solutions.

____ OTHER: _____

____ OTHER: _____

ABET Student Outcome

The program must enable students to attain, by the time of graduation:
(j) An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices. [CS]

<u>Please comment on how this project "</u>*demonstrates comprehension of the tradeoffs involved in design choices"*:

In the deliverable 1, in section 2 named Feasibility Study, we have various sections that enabled the team to understand the different tradeoffs involved in the design choices. First, we needed to describe the current system in order to understand the pre-existing issues in the system so we knew what we needed to do to improve upon it or completely redesign it. Then, we defined the purpose of our new system and proposed alternative solutions to solve the issue. We described each technology that we deemed relevant: Kepler, custom in-house workflow, and Taverna. In the descriptions we listed in details the system specifications of each technology which gave us a first idea of the pros and cons. Then, we set-up specific selection criteria in order to make our final decision: operational, technical, economic, and schedule feasibility. One of the major elements we considered was the training curve that the team members would have to go through in order to become familiar with a potential new technology. By scoring each category for each technology in the feasibility matrix and computing the total score of each we chose the highest score.