EE 221 - Data Structures and Object Oriented Programming - 3 Hours
Required course

1. *2007-2008 Catalog description*
   Introduction to data structures, object-oriented programming and abstract data types for programmers; data structures: arrays, vectors, lists, stacks, and queues; dynamic memory allocation; problems of efficiency and complexity of algorithms; searching and sorting; standard libraries dedicated to data structures and algorithms. Prerequisite: EE 102 or CS 106 with minimum grade of C.

2. *Prerequisites by topic*
   a. Computer programming in a high level language including selection and repetition statements, functions.

3. *Textbook (s) and/or other required material*
   ADTs, Data Structures, and Problem Solving with C++, 2/E by L. Nyhoff, Prentice Hall, 2005, ISBN 0-13-140909-3
   Set of complete programming examples developed to illustrate all features covered in the course – on Blackboard
   All course materials are posted on Blackboard allowing online student access.

4. *Class/Laboratory Schedule*
   Two sessions per week, each 75 minutes, for 14 weeks plus 2 hour final time slot – in spring
   or
   Three sessions per week, each 50 minutes, for 14 weeks plus 2 hour final time slot – in fall

5. *Topics Covered (Outcomes influenced)*
   - Basic data structures: primitive, arrays, multidimensional arrays, structures and unions (7a, 7b, 7c, 7e, 7f, 7g)
   - Dynamic data allocation and pointers (7a, 7b, 7e, 7f, 7g)
   - Object Oriented Programming concepts including the idea of object inheritance (7a, 7b, 7d, 7e, 7f, 7g)
   - Generalization through templates: function templates and class templates (7a, 7b, 7c, 7d, 7e, 7f, 7g)
   - Advanced data structures: stacks, queues, vectors and lists (7a, 7b, 7c, 7d, 7e, 7f, 7g)
   - Advanced data access and algorithms: Iterators and standard algorithms (7a, 7b, 7e, 7f, 7g)
   - Algorithm efficiency, sorting algorithms (7a, 7b, 7c, 7d, 7e, 7f, 7g)
   - Engineering applications - plant modeling, image processing, and robot navigation (7a, 7b, 7c, 7d, 7e, 7f, 7g)

6. *Contribution of course to meeting the curriculum components*
   Engineering science – 66%, Engineering design – 34%

7. *Course Outcomes (Program Outcome contributions):*
   In learning the course topics, the student will attain the following outcomes
   a. The student will apply moderately advanced problem solving techniques by creating and applying algorithms (9A, B, C, D)
   b. The student will apply moderately advanced concepts of structured programming by task partitioning (functions) (9A, B, C)
   c. The student will use multidimensional arrays, stacks, queues and linked lists, and apply to simple problem solving (9A, B, C, D)
   d. The student will use object oriented programming and apply it to data structure design (classes) (9A, B, C, D)
   e. The student will implement moderately advanced data organization and manipulation in software (9A, B, C, D)
   f. The student will understand better the software development process via numerous homework assignments (9A, B, C, D, F, G)
   g. The student will perform software troubleshooting (debugging) skills via numerous homework assignments (9A, B, C, D, G)

8. *Grading policy and criteria:*

The level to which students achieve the course objective is determined by the following grading policy. Homework - 25%, Exam 1 - 25%, Exam 2 - 25%, Final Exam - 25%. The final grades: A, B, C, D and F are determined by the total amount of points earned during the course using: 90%, 80%, 70% and 50% limits. Improvement in work and submission of all homework assignments will be used to determine the borderline cases. A grade of C corresponds to meeting the minimum competency required to understand course topics and attain course outcomes.

9. *Relationship of course to program outcomes*

Label	Program Outcomes (A Graduate from the program will:)	Contribution
A	have knowledge of the mathematical and scientific foundation of electrical engineering	Moderate
B	have knowledge of and the ability to apply techniques and technology of electrical engineering	Strong
C	complete a design project sequence, culminating in a capstone project at or near the professional level	Strong
D	understand that acquisition of new knowledge is needed for success in the electrical engineering profession	Strong
E	meet Bradley's general education requirements which are based on the principles of liberal education	NA
F	have experience in communicating technical information and working on teams	Foundational
G	understand the importance of professional and ethical behavior	Moderate

10. *Prepared by*: Aleksander Malinowski *on* 3/19/2008