**DALTON STATE COLLEGE**
**COMPREHENSIVE PROGRAM REVIEW**

**Program/Subject Area: Associate of Science – Computer Science**
**Review Period: Fall 2011**

## 1. PROGRAM GOAL AND STUDENT LEARNING OUTCOMES

Program goal statement: To fulfill the general education requirements of the first two years of a bachelor's degree program in computer science, and to do so in a cost effective manner.

Program outcomes:

- To be able to analyze basic qualitative/ quantitative change.
- To have a basic understanding of the scientific method and to be able to apply this understanding.
- To have a basic understanding of the structure of systems.
- To competently use the appropriate basic technology.
- To communicate intelligibly using the appropriate symbolism and terminology.

Student learning outcomes:

Students completing the computer science courses in the computer science program should be able to:

- identify fundamental data types, including arrays.
- implement I/O statements.
- use control structures, both selection and repetition.
- implement user-defined functions.
- implement user-defined simple data types.
- implement Graphical User Interfaces in programs.
- use recursion in a program.
- implement and manipulate a linked list.
- implement and manipulate a stack.
- implement and manipulate a queue.
- implement and manipulate a tree.
- implement searching and sorting algorithms.

Students completing the mathematics courses in the computer science pogram should be able to:

- display a sound understanding of limits and continuity.
- display a sound understanding of derivatives of algebraic and transcendental functions.
- apply the concepts of differential calculus to a variety of applications.
- display a sound understanding of basic integrals and their applications to areas.
- apply the principles and techniques of integration to a variety of applications.
- evaluate improper integrals.
- apply techniques of integration to evaluate both definite and indefinite integrals.
- solve separable and first-order linear differential equations.
- use the tools of calculus in polar coordinates
- apply the techniques of calculus to determine the convergence or divergence of sequences and

infinite series and, in certain cases, determine the limit of the series or sequences.

- perform vector arithmetic and use vectors to describe lines and planes in 2- and 3-space.
- apply the tools of Calculus to vector-valued functions.
- extend the concepts of calculus to functions of two or more variables.
- extend the concept of the definite integral to functions of two or more variables.
- apply the tools of Calculus to vector fields.
- perform matrix arithmetic.
- perform vector arithmetic on vectors in R2 , R3 , and generalized vector spaces.
- determine eigenvalues and eigenvectors for appropriate matrices.

## 2. MEASURES OF EFFECTIVENESS

### (a) Five-year enrollment summary by headcount, FTE, & full-time/part-time status (Fall Enrollments)

| | Fall 2007 | Fall 2008 | Fall 2009 | Fall 2010 | Fall 2011 | % Change |
|---|---|---|---|---|---|---|
| Headcount | 34 | 42 | 51 | 43 | 40 | 17.6 |
| FTE | 7 | 7.4 | 10.2 | 8.6 | 8 | 14.3 |
| Full-time | 21 | 33 | 38 | 32 | 26 | 23.8 |
| Part-time | 13 | 9 | 13 | 11 | 14 | 7.7 |

Analysis and comments:
Enrollment is trending upward with a spike in 2009.

### (b) Five-year enrollment summary by gender & race/ethnicity (Fall Enrollments)

| | Fall 2007 | Fall 2008 | Fall 2009 | Fall 2010 | Fall 2011 | % Change |
|---|---|---|---|---|---|---|
| **Gender** | | | | | | |
| Female | 2 | 6 | 5 | 4 | 4 | 100 |
| Male | 32 | 36 | 46 | 39 | 36 | 12.5 |
| **Race/Ethnicity** | | | | | | |
| American Indian | 1 | 1 | 0 | 0 | 0 | (100) |
| Asian | 1 | 1 | 2 | 1 | 1 | 0 |
| African-American | 0 | 2 | 1 | 1 | 1 | Undefined |
| Hispanic | 1 | 3 | 3 | 0 | 1 | 0 |
| White | 30 | 30 | 30 | 27 | 30 | 0 |
| Multiracial | 0 | 0 | 1 | 1 | 1 | Undefined |
| Undeclared | 1 | 5 | 14 | 13 | 5 | 400 |

Analysis and comments:
While some percentages changed during the time period, the numbers remained much the same.

## (c) Average class size, GPA, faculty/student ratios, and credit hours

| | 2006-07 | 2007-08 | 2008-09 | 2009-10 | 2010-11 |
|---|---|---|---|---|---|
| Average class size | 15.75 | 16.75 | 16 | 18.2 | 25.8 |
| Student credit hours | 202 | 218 | 324 | 422 | 590 |
| Credit hours/FTE faculty | 15 | 15 | 15 | 15 | 15 |

Analysis and comments:
While enrollment remained relatively stable, the average class size increased. This is likely due to the increased enrollment in other programs, for example mathematics and pre-engineering, which list computer science courses as electives or requirements.

## (d) Faculty teaching in program

| | 2006-07 | 2007-08 | 2008-09 | 2009-10 | 2010-11 |
|---|---|---|---|---|---|
| Total Faculty | 7 | 8 | 8 | 7 | 11 |
| Full-time Faculty | 7 | 8 | 8 | 7 | 11 |
| Part-time Faculty | 0 | 0 | 0 | 0 | 0 |
| **Gender** | | | | | |
| Male | 5 | 6 | 6 | 5 | 8 |
| Female | 2 | 2 | 2 | 2 | 3 |
| **Race/Ethnicity** | | | | | |
| American Indian/Pacific | | | | | |
| Asian | | | | | |
| African-American | | | | | |
| Hispanic | | | | | |
| White | 7 | 8 | 8 | 7 | 11 |
| Multiracial | | | | | |
| **Tenure Status (full-time)** | | | | | |
| Tenured | 3 | 2 | 2 | 4 | 5 |
| On-tenure track | 4 | 6 | 6 | 3 | 6 |
| Non-tenure track | | | | | |
| **Rank (full-time)** | | | | | |
| Professor | 1 | 1 | 1 | 3 | 2 |
| Associate Professor | 3 | 2 | 2 | | 1 |
| Assistant Professor | 2 | 4 | 3 | 3 | 4 |
| Instructor/Lecturer | 1 | 1 | 2 | 1 | 4 |
| **Highest Degree (full-time)** | | | | | |
| Doctorate | 6 | 7 | 6 | 6 | 7 |
| Specialist | | | | | |
| Master's | 1 | 1 | 2 | 1 | 4 |
| Bachelor's | | | | | |
| Associate's/Other | | | | | |

Analysis and comments:
Many of the courses required for this program are either computer science or are at the sophomore level. Therefore, full-time faculty taught all of the courses.

**(e) Percent of classes taught by full-time faculty**

| 2006-07 | 2007-08 | 2008-09 | 2009-10 | 2010-11 |
|---|---|---|---|---|
| 100 | 100 | 100 | 100 | 100 |

Analysis and comments:
Many of the courses required for this program are either computer science or are at the sophomore level. Therefore, full-time faculty taught all of the courses.

**(f) Number of degrees conferred**

| 2006-07 | 2007-08 | 2008-09 | 2009-10 | 2010-11 |
|---|---|---|---|---|
| 0 | 1 | 1 | 1 | 2 |

Analysis and comments:
The number of students graduating is low relative to the number of students enrolled in the program. Ancillary evidence indicates that many students are transferring to bachelor's programs at other institutions before receiving an associate's degree from Dalton State.

**(g) Placement rates: Five-year summary of job placement rates, if applicable**

| 2006-07 | 2007-08 | 2008-09 | 2009-10 | 2010-11 |
|---|---|---|---|---|
| na | na | na | na | na |

Analysis and comments:
This is a transfer program which does not prepare students for job placement.

**(h) Average cost per credit hour**

| | 2006-07 | 2007-08 | 2008-09 | 2009-10 | 2010-11 |
|---|---|---|---|---|---|
| **Cost per FTE** | | | | | $3,008 |
| **Cost per hour** | | | | | $100.26 |

Analysis and comments: The in-state tuition and institutional fee for a student taking 15 credit hours is $2,894 per academic year. This is comparable to the cost per FTE ($3,008) which indicates that the program is cost effective.

**(i) Cost per FTE Faculty**

| 2006-07 | 2007-08 | 2008-09 | 2009-10 | 2010-11 |
|---|---|---|---|---|
| | | | | $57,630 |

Analysis and comments: This is the average cost (salary + benefits) of a full-time faculty member who teaches in the program.

**(j) Summary and evidence of achievement of program outcomes**

Describe the extent to which students have achieved current program outcomes

The benchmark for outcomes 2 and 3 is that 70% of the students completing the program will achieve the desired result.

- To be able to analyze basic qualitative/ quantitative change.

  Students completing this program successfully complete Precalculus, Calculus and Analytic Geometry I, and Calculus and Analytic Geometry II. The learning outcomes for those classes require students to analyze change as it relates to functions of a single variable using mathematical tools. The learning outcomes include: 1. applying the concepts of differential calculus to a variety of applications, 2. applying the principles and techniques of integration to a variety of applications, and 3. solving separable and first-order linear differential equations. More than seventy percent of the students completing the courses demonstrated an ability to complete the tasks.

- To have a basic understanding of the scientific method and to be able to apply this understanding.

  Students completing the program satisfy area D by completing a lab science sequence. In the assessment of the learning outcomes of those classes, more than seventy percent of the students demonstrated an ability to understand and explain the scientific method and apply it to solving scientific problems.

- To have a basic understanding of the structure of systems.

  Students completing the program are required, in area D, to successfully complete a lab science sequence. The general learning outcomes of those classes state that students will demonstrate an understanding of systems. For example, in biology students are required to demonstrate an understanding of animal systems, in chemistry, they study the equilibrium of systems, in geology, students describe the theory of plate tectonics, its relation to the rock cycle and continental evolution and in physics, students represent physical systems in multiple representations: i.e., mathematically, pictorially, graphically, etc. In the assessment of the learning outcomes of those courses, more than seventy percent of the students demonstrated an ability to understand the structure of systems in each outcome.

- To competently use the appropriate basic technology.

  This program requires proof of computer literacy which students demonstrate by completing a class in which computers are utilized or by successfully completing a computer literacy exam.

- To communicate intelligibly using the appropriate symbolism and terminology.

  Students completing this program successfully complete Precalculus, Calculus and Analytic Geometry I, Calculus and Analytic Geometry II, Principles of Programming I, and Principles of Programming II. Intelligent communication using symbols and

terminology is required throughout the assignments in those courses. For example, in Calculus and Analytic Geometry II, students demonstrate an ability to apply the techniques of calculus to determine the convergence or divergence of sequences and infinite series and, in certain cases, determine the limit of the series or sequences. This requires developing terminology and symbolism most students have not seen before, then using that terminology to communicate ideas and results involving infinite series. In Principles of Programming I and II students are required to learn a programming language in which symbols are ubiquitous.

**(k) Summary and evidence of achievement of student learning outcomes**

Describe the extent to which students have achieved current student learning outcomes in Area F and/or upper-division courses, if applicable. (current year)

The outcomes were assessed and the benchmark was met in all of the computer science outcomes. The benchmark was not met for two of the mathematics outcomes. This is being addressed by using additional class time for students to practice and conceptualize the ideas.

**(l) Evidence of program viability**

Based on enrollment history, retention rates, degree completion/graduation rates, and other program outcomes, comment on whether continued resources should be devoted to this program. Your comments should consider external factors such as the following: Are your students getting jobs? What is the job outlook for graduates? Are students prepared for the jobs they get? How is the field changing? Are the program faculty members in touch with employers and getting feedback on our students' performance? Do employers see a need for changes in the program?

Students enrolled in this program are planning to transfer to another IHE and complete a bachelor's degree in computer science.

## 3. USE OF ASSESSMENT RESULTS FOR PROGRAM IMPROVEMENT

What improvements have occurred since the last program review or assessment?

The program has not been reviewed.

## 4. REVIEW OF CURRICULUM

What changes or revisions have been made to the program, its curriculum, or its student learning outcomes since the last program review or assessment?

The program has not been reviewed. It is expected that the curriculum will change and enrollment and graduation rates will increase due to the integration of the computer technology programs from the current School of Technology into the School of Natural Sciences and

Mathematics (which will become the School of Science, Technology, and Mathematics). Also, there are plans to develop a bachelor's program in an area of technology related to computer programming and security.

## 5. PROGRAM STRENGTHS AND WEAKNESSES

Strengths: The program prepares students to transfer into a computer science program at another institution. Based on ancillary data, the students are prepared to succeed at the receiving institution.

Weaknesses and concerns: The program has a very low graduations rate. This could be due to several factors, one of which is the lack of sophomore level computer science courses.

## 6. RECOMMENDATIONS FOR FOLLOW-UP AND/OR ACTION PLANS (if needed)

Issue/concern:

The low graduation rate.

Specific action(s):

Survey students to determine if students are transferring before graduation or dropping out of the program.

Expected outcomes:

Changes in the program, based on the surveys, which will increase the graduation rate.

Time frame:

3 years

Person(s) responsible:

Dr. Randall Griffus and Dr. Thomas Gonzalez

Resources needed:

None.

**Prepared by**
**Randall Griffus** _____ **Date** 4/25/2012

**Reviewed by Chair of Program Review Subcommittee**
_____ **Date** 4/25/2012

**Reviewed/Approved by Vice President for Academic Affairs**
_____ **Date** 4/25/12