DALTON STATE COLLEGE
COMPREHENSIVE PROGRAM REVIEW

Program/Subject Area: Associate of Science – Physics/Pre-Engineering
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 physics or pre-engineering, 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 mathematics courses in the physics/pre-engineering program 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.

Students completing the physics courses in the physics/pre-engineering program should be able to:

- interpret physical situations as stated in a word problem.
- identify the physical laws appropriate to the physical situation at hand.
- use mathematical/physical laws as a tool for prediction of behavior of representative physical

systems.
- use various types of data collection tools for the experimental investigation of physical   laws.
- represent physical systems in multiple representations: i.e., mathematically, pictorially, graphically, etc.
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- represent physical systems in multiple representations: i.e., mathematically, pictorially, graphically, etc.

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	79	92	112	123	124	57
FTE	21.06	24.5	29.86	32.8	33.06	57
Full-time	56	78	97	102	95	69.6
Part-time	23	14	15	21	29	26.1

Analysis and comments:
Enrollment is trending upward. Many of the students are in the RETP program and are planning to transfer to the Georgia Institute of Technology to complete a degree in engineering. The popularity of that program is likely responsible for the enrollment growth.

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

	Fall 2007	Fall 2008	Fall 2009	Fall 2010	Fall 2011	% Change
Gender						
Female	3	5	10	11	15	400
Male	76	87	102	112	109	43.4
Race/Ethnicity						
American Indian	0	0	0	0	3	Undefined
Asian	6	3	2	3	7	16.7
African-American	0	0	0	2	5	Undefined
Hispanic	13	10	9	7	5	(46.2)
White	60	66	66	79	72	20
Multiracial	0	1	3	2	4	Undefined
Undeclared	0	12	32	30	28	undefined

Analysis and comments:
While the decline in the number of Hispanic students is a concern, the increase in the number of female, African-American, and Multiracial is encouraging. Both changes deserve investigation.

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

	2006-07	2007-08	2008-09	2009-10	2010-11
Average class size	15.6	21	18.4	20.4	21.4
Student credit hours	188	252	368	408	428
Credit hours/FTE faculty	15	15	15	15	15

Analysis and comments:
As the enrollment trends upward, the number of students enrolling in physics and calculus classes is increasing.

(d) Faculty teaching in program

	2006-07	2007-08	2008-09	2009-10	2010-11
Total Faculty	6	8	8	7	10
Full-time Faculty	6	8	8	7	10
Part-time Faculty	0	0	0		0
Gender					
Male	6	7	6	5	7
Female	0	1	2	2	3
Race/Ethnicity					
American Indian/Pacific					
Asian					
African-American			1	1	1
Hispanic					
White	6	8	7	6	9
Multiracial					
Tenure Status (full-time)					
Tenured	2	2	2	4	5
On-tenure track	4	6	6	3	5
Non-tenure track					
Rank (full-time)					
Professor	1	1	1	3	2
Associate Professor	2	2	1		1
Assistant Professor	3	5	6	4	5
Instructor/Lecturer	0				3
Highest Degree (full-time)					
Doctorate	6	8	8	7	7
Specialist					
Master's					3
Bachelor's					
Associate's/Other					

Analysis and comments:
Many of the courses required for this program are at the sophomore level. Therefore, full-time faculty taught all of the courses. The number and diversity of the faculty who teach the courses has increased due to increasing enrollment and the increasing number of female faculty in the School of Natural Sciences and Mathematics.

(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 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
2	4	5	9	9

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					$2,938
Cost per hour					$97.94

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 ($2,938) which indicates that the program is cost effective.

(i) Cost per FTE Faculty

2006-07	2007-08	2008-09	2009-10	2010-11
				$56,560

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 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 Principles of Chemistry I and Principles of Chemistry II. 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 F, to successfully complete Principles of Physics I and Principles of Physics II. The general learning outcomes of those classes state that students will 1. use mathematical/physical laws as a tool for prediction of behavior of representative physical systems, and 2. 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 Chemistry I, Principles of Chemistry II, Principles of Physics II, and Principles of Physics 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.

(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 student learning outcomes were assessed and the benchmark was met in all of the physics courses and for all but two outcomes in the mathematics courses. For those outcomes where the benchmark was not met, we are allotting 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 physics or pre-engineering. Many of the students are in the Regents Engineering Transfer Program and will complete a bachelor's degree at Georgia Tech. One point of particular pride is the performance of our students after transferring to Georgia Tech. According to the most recent RETP Student Status Report, over seventy-five percent of our students maintain a GPA of 3.00 or better after transferring.

3. USE OF ASSESSMENT RESULTS FOR PROGRAM IMPROVEMENT

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

Dalton State began participating in the Regents Engineering Transfer Program (RETP) in 2003. During this time enrollment has grown significantly, from 43 to 124. As a result of entering the RETP and because of the enrollment growth, we have improved the program by increasing number of pre-engineering courses offered as well as the frequency at which they are offered. In

2003 -2004, we did not offer engineering courses and many of the mathematics courses required in the pre-engineering major were offered one time per year, if at all.

4. REVIEW OF CURRICULUM

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

As a result we have added additional courses to the curriculum. The new courses include:

CMPS 1371	Computing for Scientists and Engineers
ENGR 1105K	Introduction to Engineering
ENGR 1108K	Engineering Graphics
ENGR 2205	Statics
MATH 2403	Differential Equations
MATH 2602	Linear and Discrete Mathematics
MATH 2770	Statistics and Applications

5. PROGRAM STRENGTHS AND WEAKNESSES

<u>Strengths</u>: Enrollment is growing and students who transfer to Georgia Tech do very well in the programs there.

<u>Weaknesses and concerns</u>:

The graduation rate is low. This is likely due to the fact that many students transfer to Georgia Tech before receiving an associate's degree at Dalton State.

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

<u>Issue/concern</u>:

The graduation rate is low.

<u>Specific action(s)</u>:

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

<u>Expected outcomes</u>:

The graduation rate will increase.

Time frame:

3 years.

Person(s) responsible:

Dr. Randall Griffus and Dr. Emma Cooley

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___