

Program Review - 2007

**Associate of Science
Chemistry and Pre-Chemical Engineering
Degree Program**

Program Instructors: Luka Kapkiai, Obie Pennington

Introduction:

The Associate of Science with emphasis in Chemistry and Pre-Chemical Engineering provides students with the general education courses normally taken in the first two years at a four-year college or university. These students will typically major in chemistry or chemical engineering or a field in the biological sciences.

Section 1: Alignment of program mission and purposes with mission and purposes of NCCC.

The Associate of Science degree in Chemistry and Pre-Chemical Emphasis upholds all the missions and purpose of Neosho County Community College (NCCC). The mission for Chemistry and Pre-Chemical Engineering Emphasis here at NCCC is to prepare chemistry and Pre-chemical Engineering students for higher-level courses in their fields when they transfer to a four-year college and to provide all students with an understanding of the process of science and laboratory techniques.

NCCC Purpose 1

- **student learning through**
 - the meeting of students' needs,
 - quality educational programs, and
 - effective assessment processes;

Students pursuing an associate of science degree in with an emphasis in Chemistry and Pre-Chemical Engineering at NCCC are required to take all the courses listed in Section 2 under program courses. Every course offered in this emphasis is assessed every semester that it is offered. The assessment process is adapted from the guidelines outlined for assessing courses at NCCC.

NCCC Purpose 2

- **student success through**
 - providing personal attention,
 - individualized advising, and
 - the opportunity to meet personal goals;

The sizes of our Chemistry classes are small and thus the faculty will get to know each student as an individual. Students have many opportunities to develop beneficial relationships with the faculty at NCCC. The Chemistry and Physics faculty members are committed to helping students become life-long learners. This can be seen when faculty members help students with career and educational opportunities after graduating from NCCC and by showing them the joys of exploring chemistry in the real world.

NCCC Purpose 3

- **ensuring access through**
 - affordability,
 - flexible delivery and scheduling methods,
 - responsive student services, and

- safe and comprehensive facilities;

The courses for Chemistry and Pre-Chemical emphasis are always scheduled and in accordance with the course rotation schedule. This enables our students to know what courses are offered each semester. This rotation schedule also allows other instructors the ability to advise our students of what courses are being offered.

NCCC Purpose 4

- **responsiveness to our stakeholders through**
 - open communication,
 - ethical management of resources,
 - accountability, and
 - the development of leaders;

Chemistry and Pre-Chemical instructors at NCCC communicate to the department chair and to the administration about the needs, changes, progress, and even weakness that the program is facing. All the resources available for use in the program are used accordingly and a record of supplies (such as lab consumables and apparatus) is kept for accountability. Laboratory courses offer the instructors the opportunity to engage students in groups during lab experiments for instance which helps them develop leadership among themselves.

NCCC Purpose 5

- **meeting community needs through**
 - collaboration and innovation,
 - lifelong learning opportunities,
 - cultural enrichment, and
 - the providing of an educated workforce.

The division of applied science (Chemistry and Physics) is still exploring ways of forging collaboration with local companies such as Chanute Manufacturing, Ash Grove and etc. to offer internships or training opportunities for those students who plan on joining the work force as soon as they finish their associate degrees or want to gain some experience.

Section 2: Curriculum of Program and Outcomes Assessment

Program Outcomes

Upon completion of Chemistry and Pre-Chemical Engineering program, learners should be able to:

- Demonstrate an understanding of chemical calculations and in solving stoichiometry problems.
- Describe atomic structure, periodicity, chemical reactions, chemical bonds and name chemical compounds.
- Define matter and demonstrate an understanding of the properties of solids, liquids, and gases in relation with energy.
- Define and classify acids and bases and the different reactions they undergo.

- Demonstrate an understanding in measuring; mechanics of motion, and thermal properties of matter, by application in problem solving.
- Demonstrate an understanding of electricity, magnetism, and optics by application in problem solving.
- Gather and record qualitative and quantitative data accurately, and master basic lab techniques such as the use of graphing calculators in mathematics and in physics.

Courses in Program

- CHEM 125 – College Chemistry I
- CHEM 126 – College Chemistry I Lab
- CHEM 135 – College Chemistry II
- CHEM 136 – College Chemistry II Lab
- PHYS 104 – Engineering Physics I
- PHYS 105 – Engineering Physics II
- PHYS 140 – Engineering Physics I lab
- PHYS 145 – Engineering Physics II Lab
- MATH 150 – Analytic Geometry and Calculus I
- MATH 155 – Analytic Geometry and Calculus II

Assessments

Course assessments consisted of regular examinations. Program assessments were assembled from individual course assessments.

Method 1

CHEM PRGM OTCM	<u>CO #</u>	<u># ASMNTS</u>	<u># ASMNTS MET</u>	<u>% ASMNTS MET</u>
OTCM GRAND TOTALS	67	704	630	89%

Method 2

CHEM PRGM OTCM	<u>CO #</u>	<u># ASMNTS</u>	<u>WEIGHTED AVG %</u>	<u>GOALS MET</u>	<u>GOALS UNMET</u>
PRGM OTCM GRAND TOTALS	67	656	76	40	15

In general, there are 67 course outcomes for Chemistry and Pre-Chemical Program outcomes. Using assessment Method 1, students are passing the course outcomes at a rate of 89 %; while using Method 2 they have a weighted average of 76 %. The data therefore suggest that the students are learning and passing the program outcomes. At this time there are no program changes. The approach of teaching chemistry keeps on changing depending on new developments in the field of science, and so new equipments and lab supplies will always be required to meet the new technologies in science that keep on changing.

Transferability of Program and Program Courses

Table 1. Course Transfer Equivalencies to Regents Universities

NCCC Course	University of Kansas	Kansas State University	Emporia State University	Pittsburgh State University	Wichita State University	Fort Hays State University	Washburn University
CHEM 125	CHEM 125	CHM 210	CH 123	CHEM 215	???	CHEM 120	LDE
CHEM 126	CHEM 125	CHM 210	CH 124	CHEM 216	???	CHEM 120L	LDE
CHEM 135	CHEM 188	CHM 230	CH 126	CHEM 225	???	CHEM 122	LDE
CHEM 136	CHEM 188	CHM 230	CH 127	CHEM 226	???	CHEM 122L	LDE
PHYS 104	PHSX 211	PHYS 213	PH 190	PHYS 104	???	PHYS 211	PS 281
PHYS 105	PHSX 212	PHYS 214	PH 193	PHYS 105	???	PHYS 212	PS 282
PHYS 140	PHSX 211	PHYS 213	PH 191	PHYS 130	???	PHYS 211L	LDE
PHYS 145	PHSX 212	PHYS 214	PH 194	PHYS 131	???	PHYS 212L	LDE
MATH 150	MATH 121	MATH 220	MA 161	MATH 150	???	MATH 234	MA 151
MATH 155	MATH 122	MATH 221	MA 262	MATH 155	???	MATH 235	MA 152

*LDE = lower division elective

Note:??? = No information was collected from that particular course

It is clear from the table above that most of our courses are transferring smoothly to the University of Kansas, Kansas State University, Pittsburg State University, Emporia State University, and Fort Hays State University. Further transfer guidelines to the other regent universities will be evaluated later.

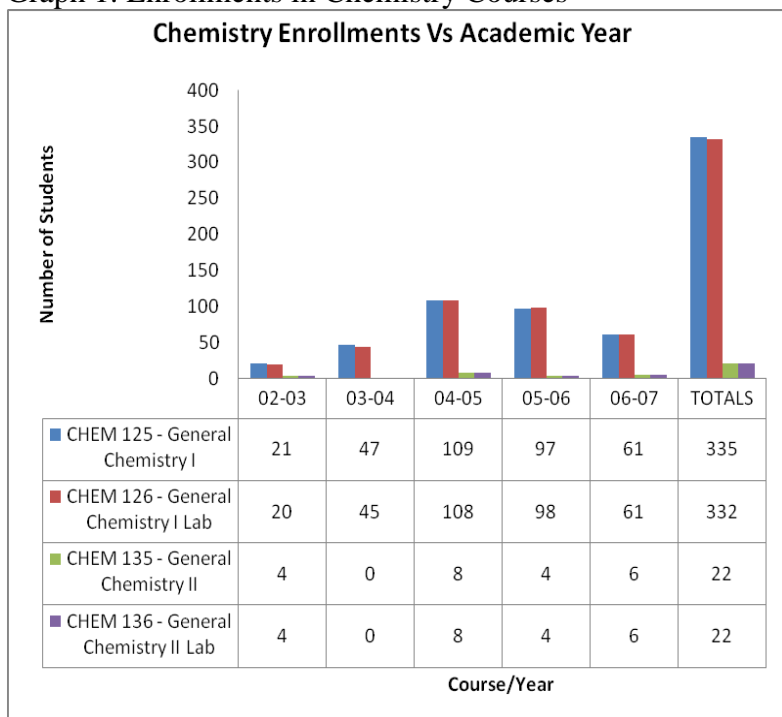
Efforts to stay current in curriculum

The faculty stays current in the curriculum by participating in statewide core competency meetings and scientific advisory groups. They also attend conferences such as League of Innovations, take additional graduate courses, and read scientific literature. In particular Luka Kapkiai is taking graduate courses such as philosophy of education and applied statistics geared towards a degree in Education.

Section 3: Data – Enrollment and Costs

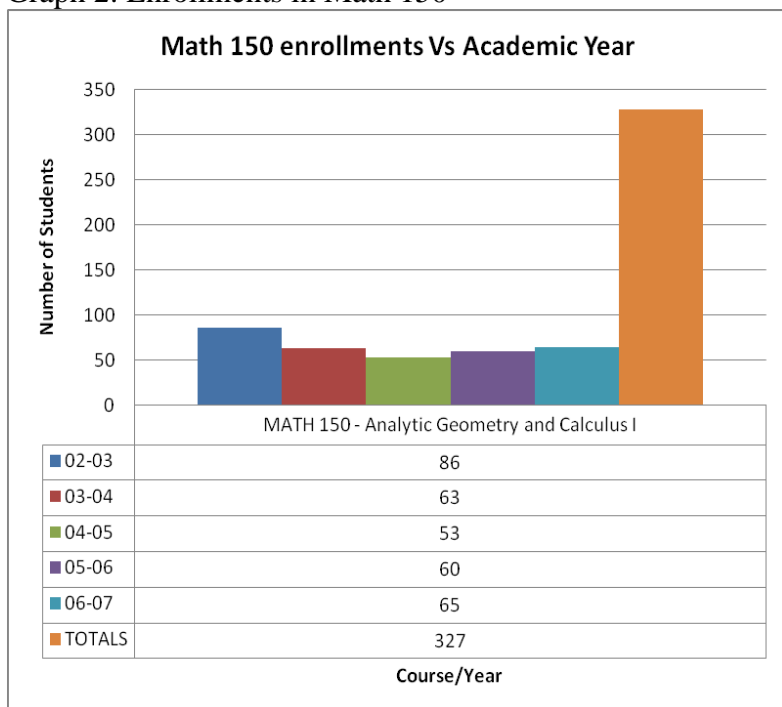
The graphs represented below indicate the enrollment numbers per year for the last five years for each course listed under this program review.

Graph 1: Enrollments in Chemistry Courses



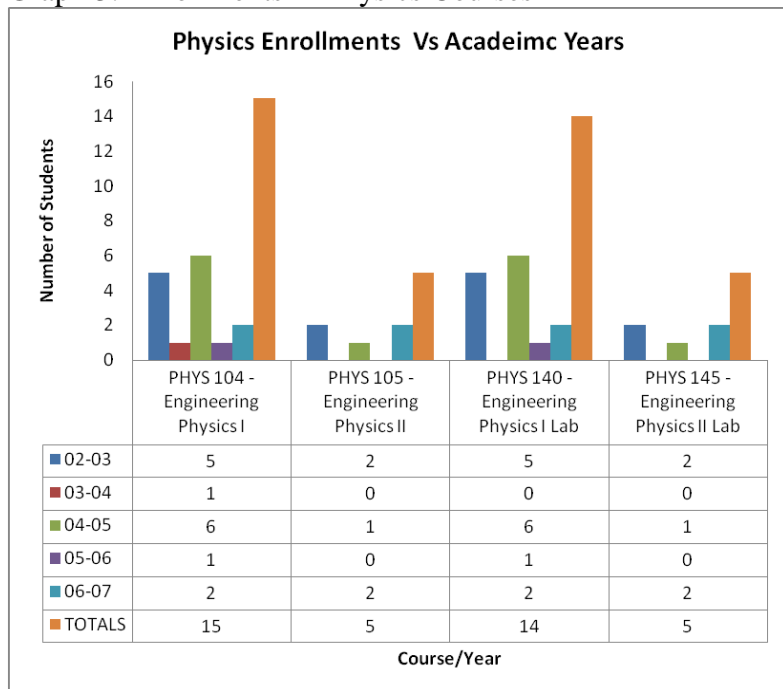
There was an a sharp increase in the enrollment numbers for Chemistry I in 04-05 and then a decrease from 05-06 and 06-07. The enrollments in Chemistry II has been fairly steady although there were no enrolments in 03-04.

Graph 2: Enrollments in Math 150



There has been a fairly steady enrollments in Math 150 from year to year.

Graph 3: Enrollments in Physics Courses



Enrollments in Engineering Physics have not been steady from year to year. About 67 % of students enrolling in Engineering Physics I are not continuing with Engineering Physics II.

Students in Chemistry and Pre-Chemical Engineering Major

There were seven students majoring in Chemistry, none of whom appear to have graduated from the program and one is still attending NCCC. The reason as to why there are no students graduating might be attributed to the fact that most of the students start and transfer to other colleges after attending NCCC for a semester or two.

Withdraw numbers and percentages from each course

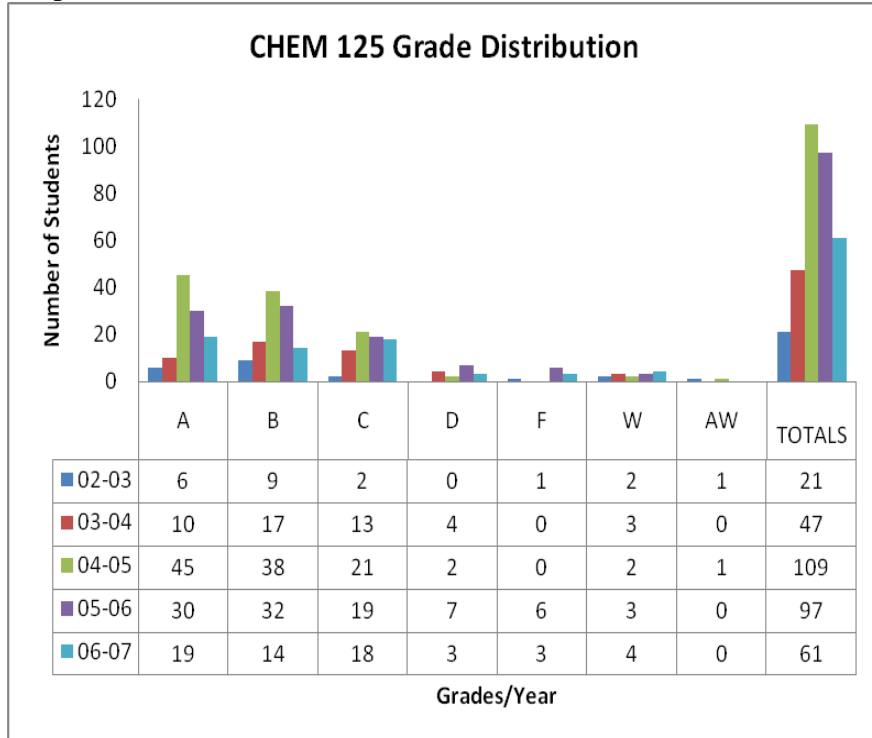
The data presented below indicate the percentage of students who withdrew or were withdrawn from the specified courses.

	Withdrawals	% Withdrawn
CHEM 125	16	5%
CHEM 126	17	5%
CHEM 135	0	0%
CHEM 136	0	0%
PHYS 104	1	7%
PHYS 105	0	0%
PHYS 140	1	7%
PHYS 145	0	0%
MATH 150	3	1%

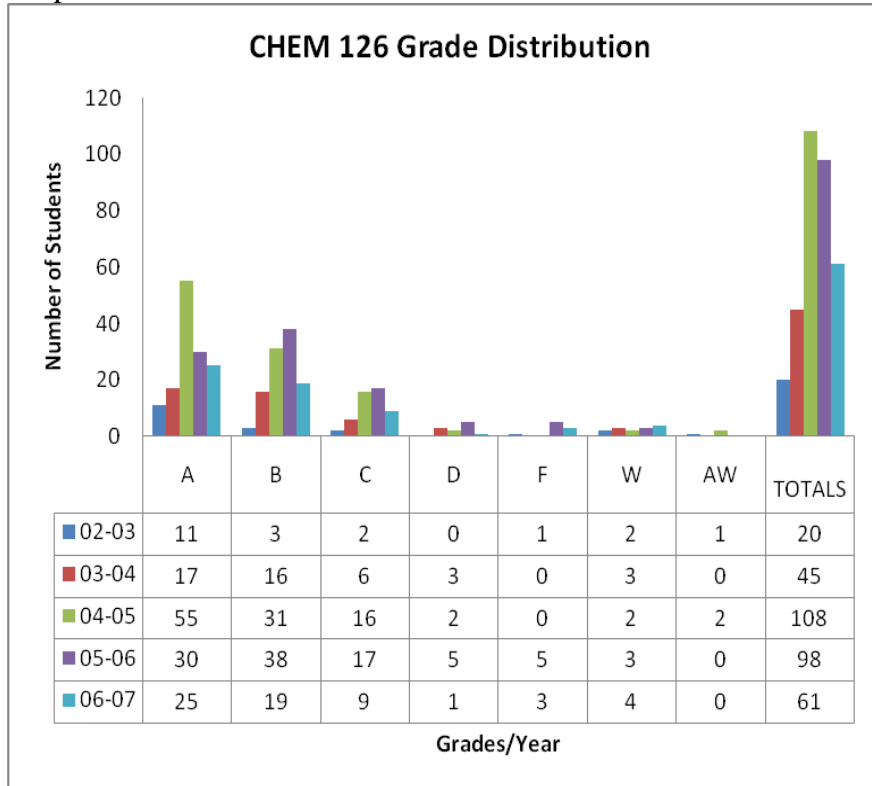
Grade distribution

The graphs shown in this section represent the letter grades given out for the various courses in this program review for the last five years (period 2000 – 2005). Majority of the students are achieving a grade of better than a C in all the courses included in this review.

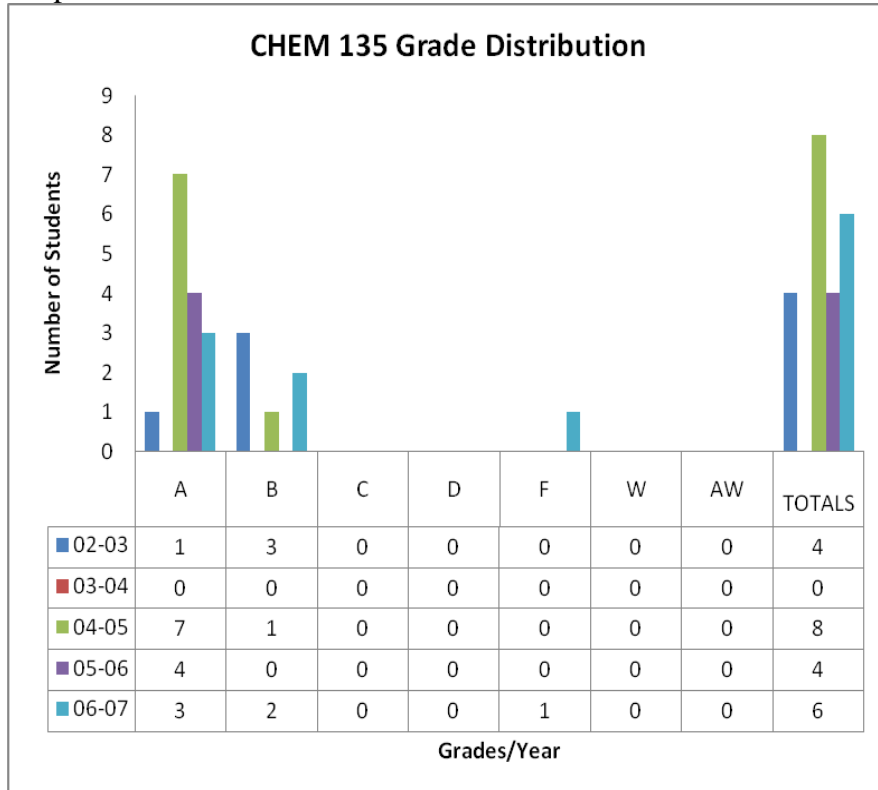
Graph 1: CHEM 125 Grade Distributions



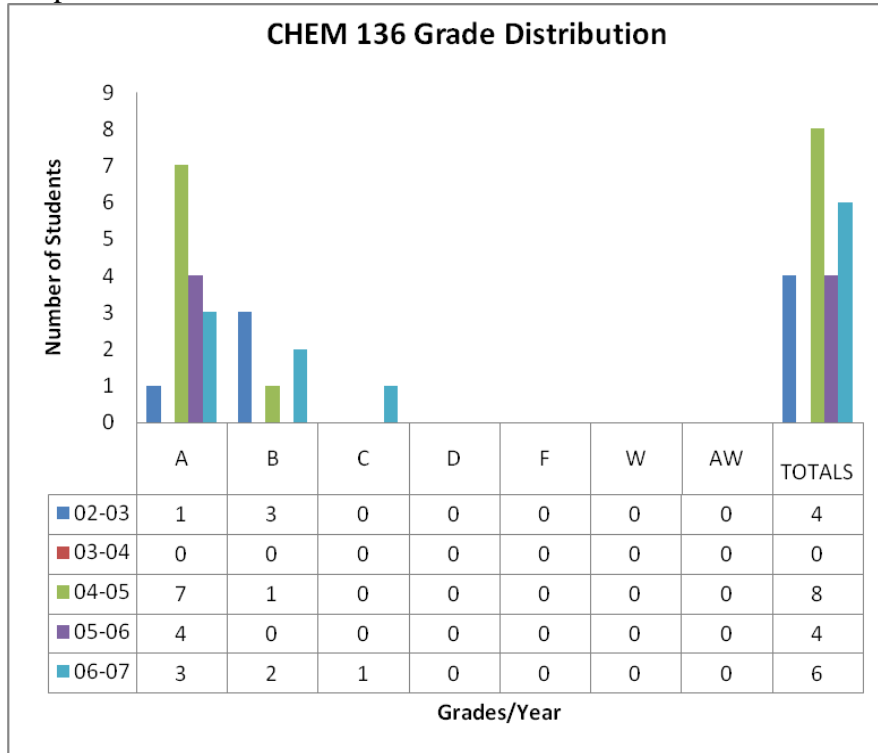
Graph 2: CHEM 126 Grade Distributions



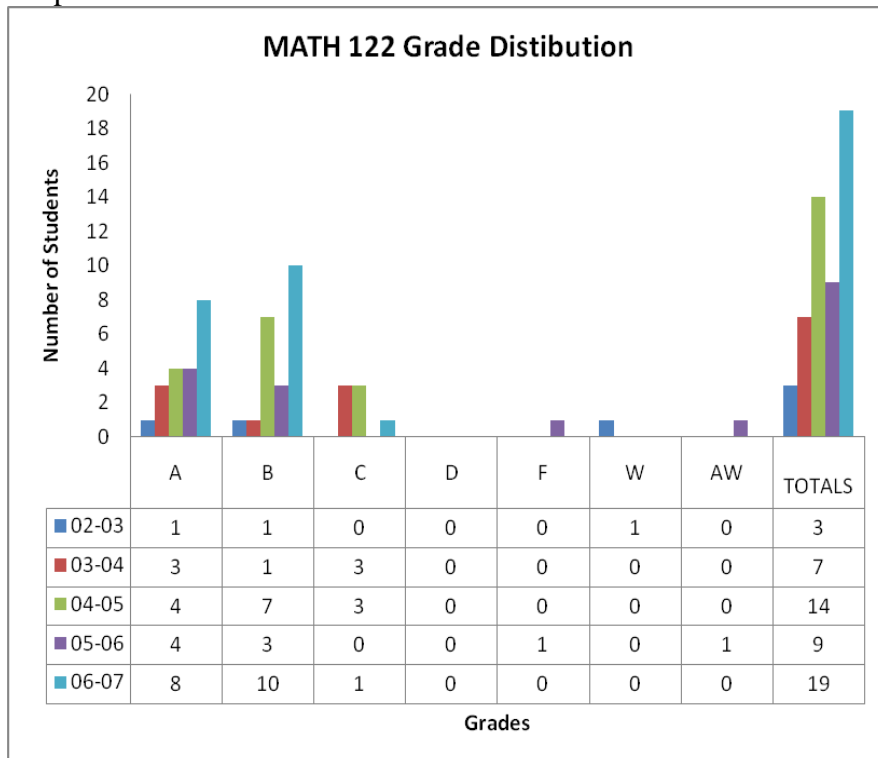
Graph 3: CHEM 135 Grade Distributions



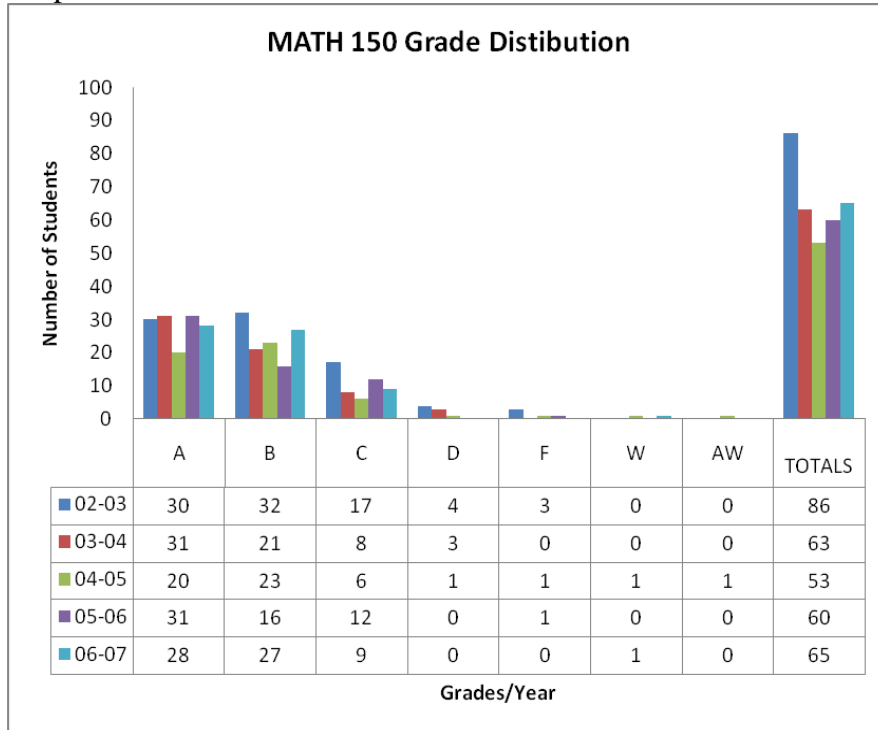
Graph 4: CHEM 136 Grade Distributions



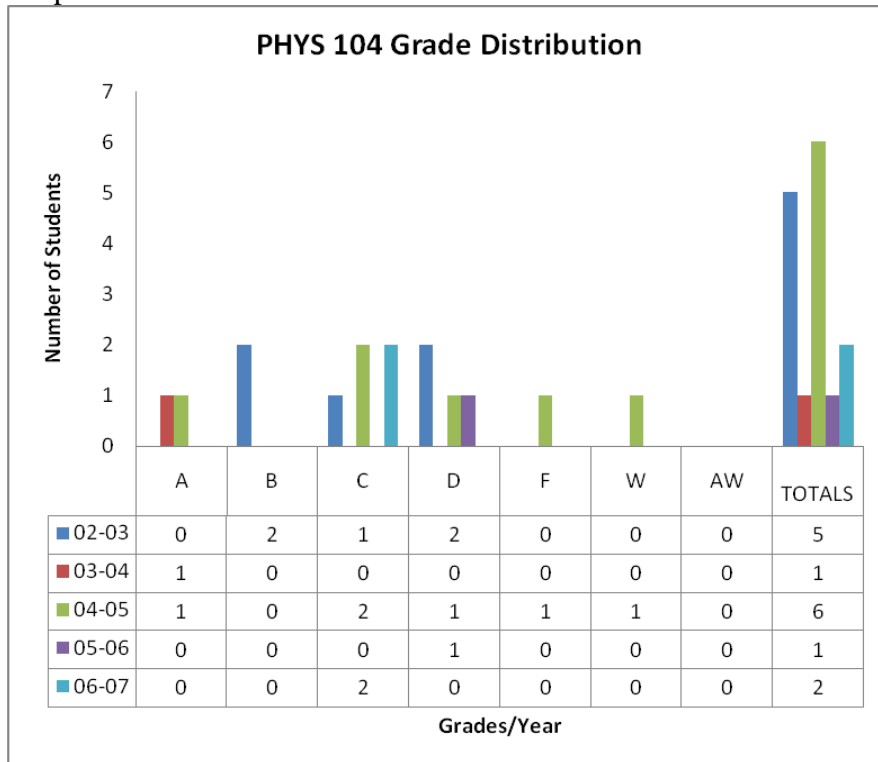
Graph 5: MATH 122 Grade Distributions



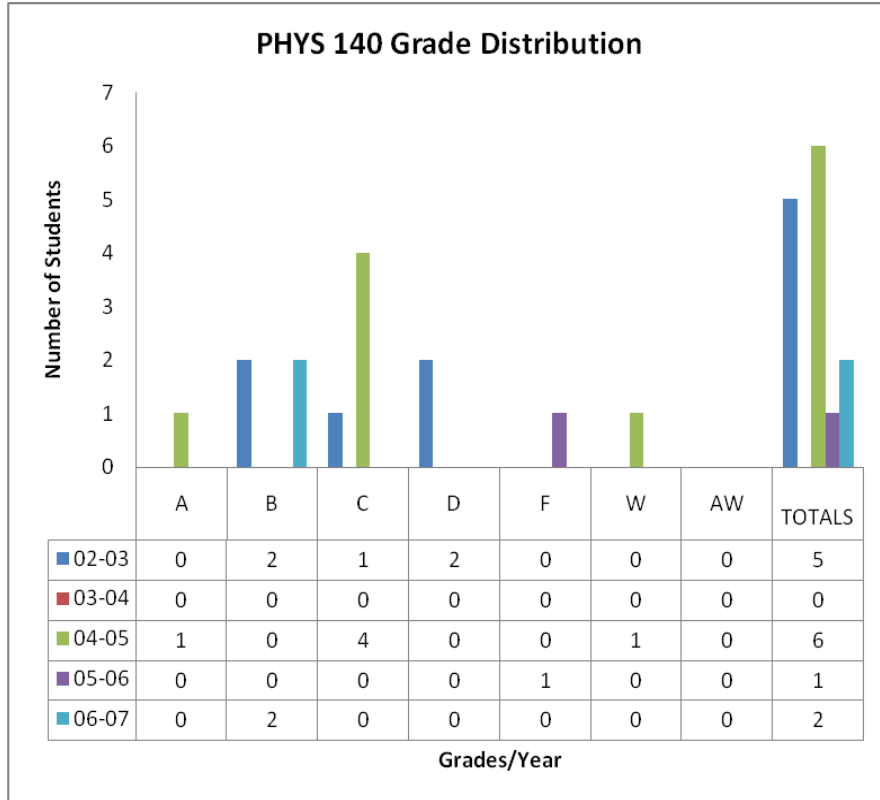
Graph 6: MATH 150 Grade Distributions



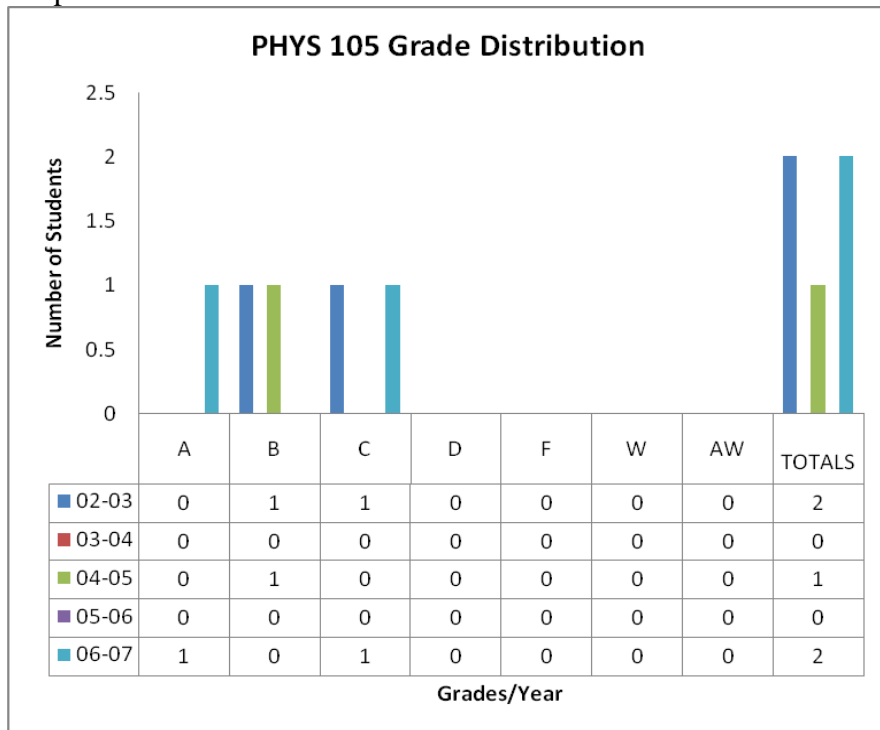
Graph 7: PHYS 104 Grade Distribution



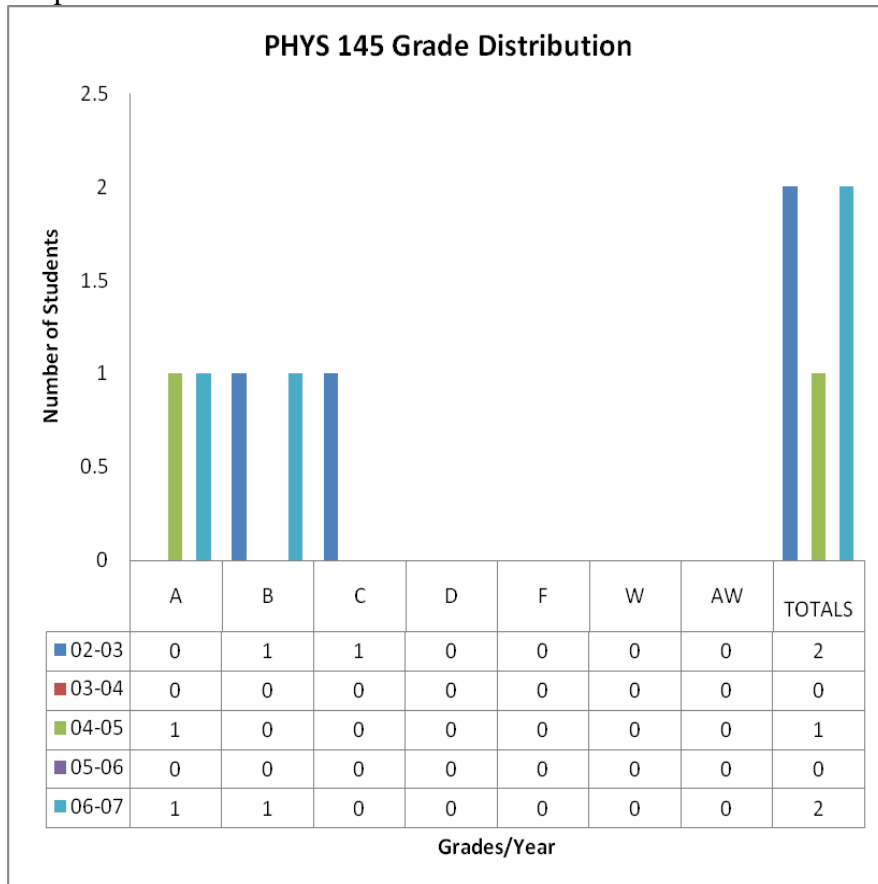
Graph 8: PHYS 140 Grade Distribution



Graph 9: PHYS 105 Grade Distribution



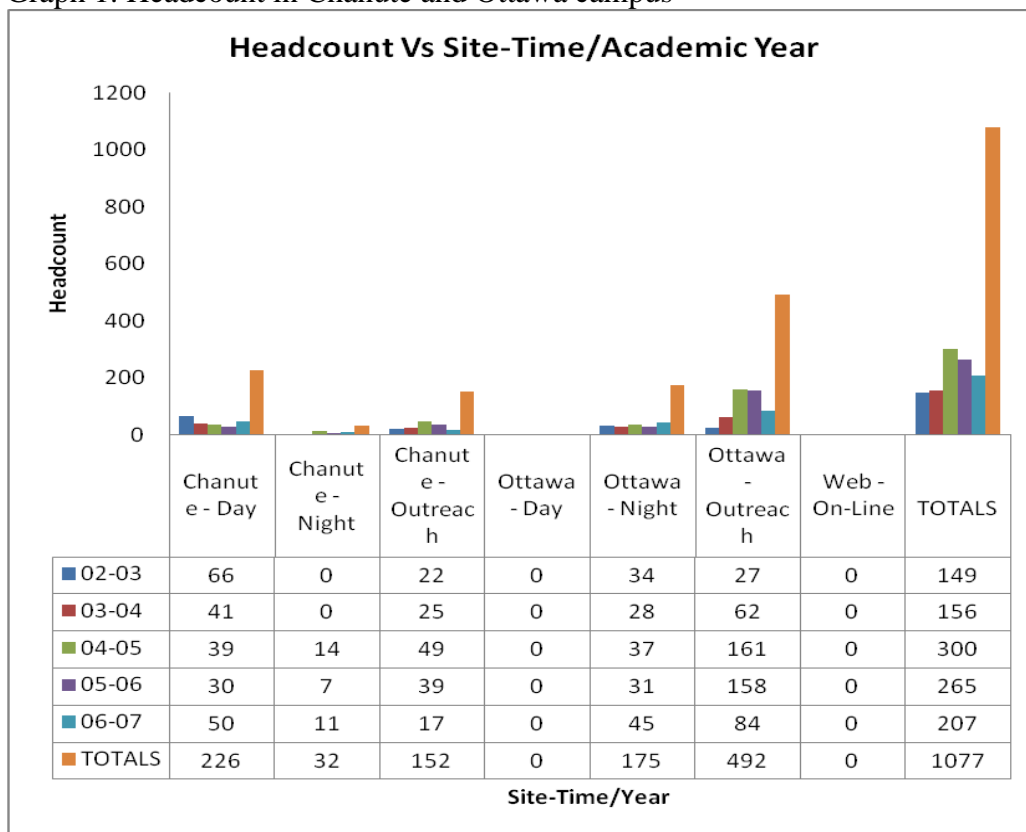
Graph 10: PHYS 145 Grade Distribution



Enrollment by site, day/night

The graphs shown below indicate the number of students enrolled in the emphasis course at the Chanute and Ottawa campuses. Also presented in the graphs are the enrollments times (day or night). In the Chanute campus majority of the students are enrolled during the day during the evening hours. In the Ottawa campus there are no students enrolled during the day. There are a good number of students enrolled in the outreach sites for both Chanute and Ottawa campuses.

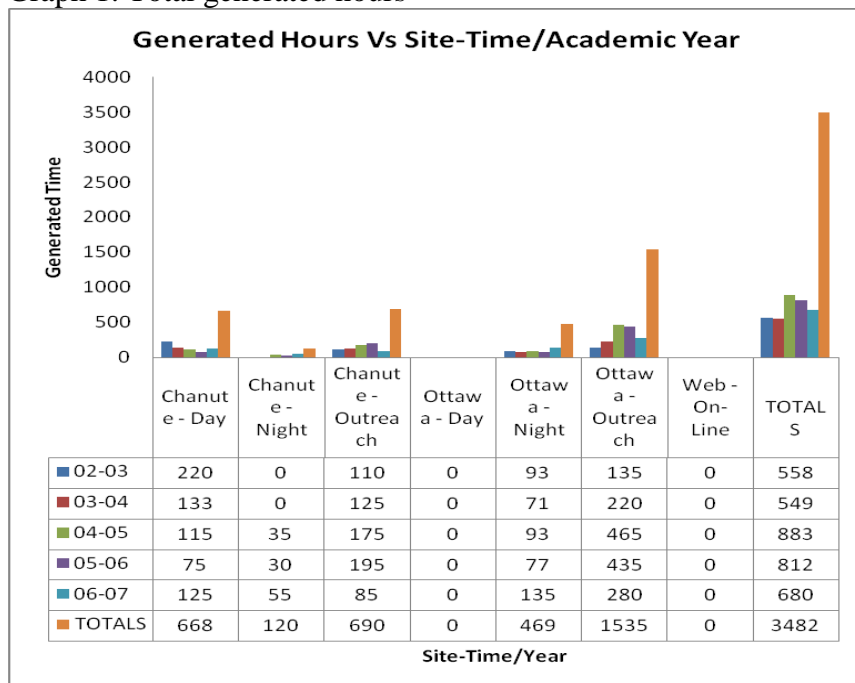
Graph 1: Headcount in Chanute and Ottawa campus



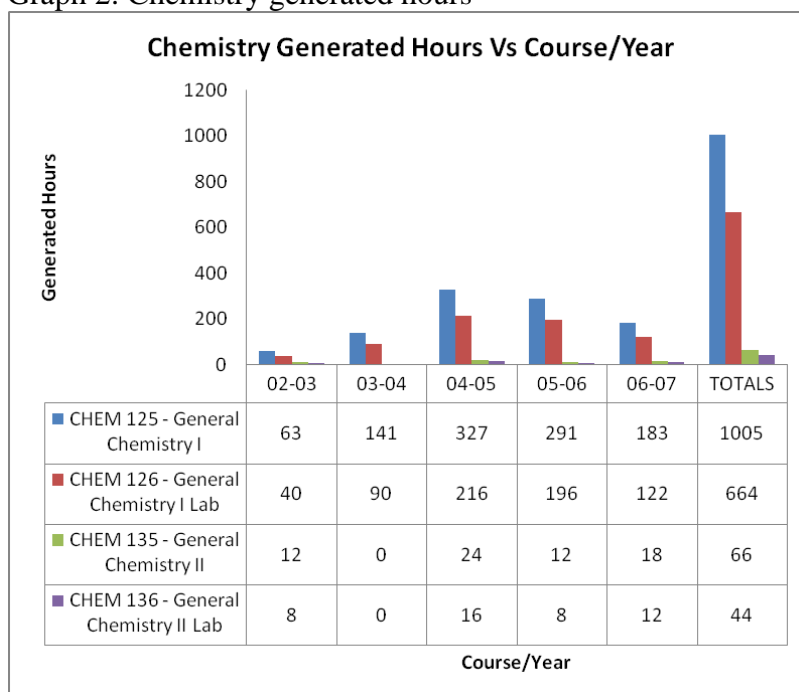
Credit hours generated

The graphs presented below shows total generated hours in both the Chanute and Ottawa campus and the individual generated hours of the courses in the associate of science degree in Chemistry and Pre-Chemical Engineering program.

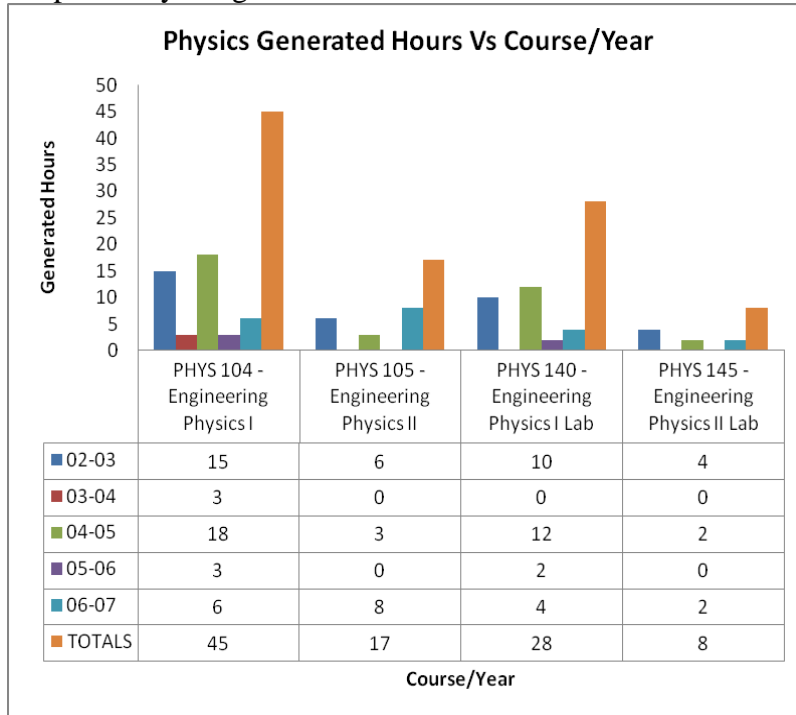
Graph 1: Total generated hours



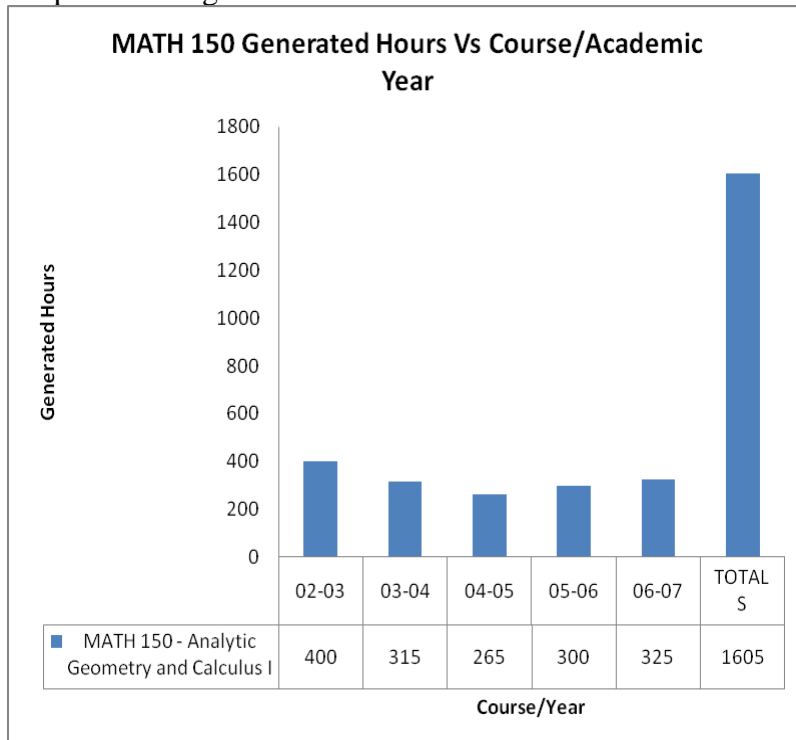
Graph 2: Chemistry generated hours



Graph 3: Physics generated hours

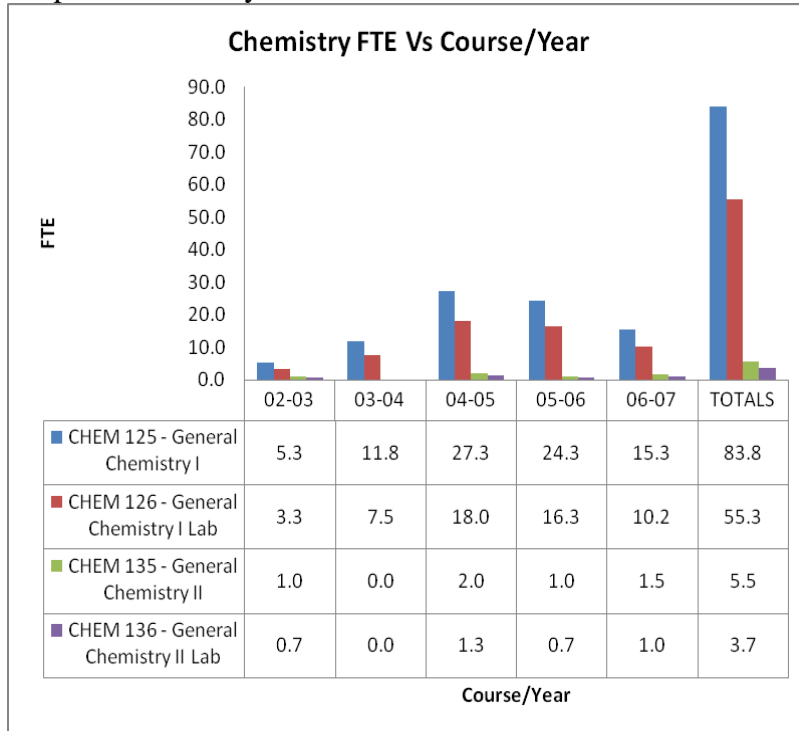


Graph 4: Math generated hours

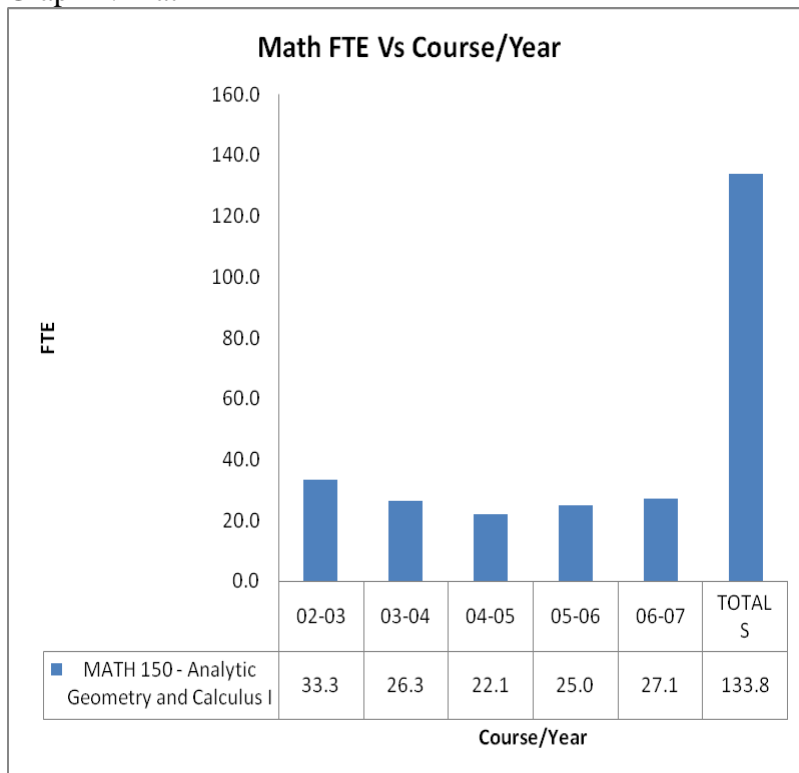


FTE

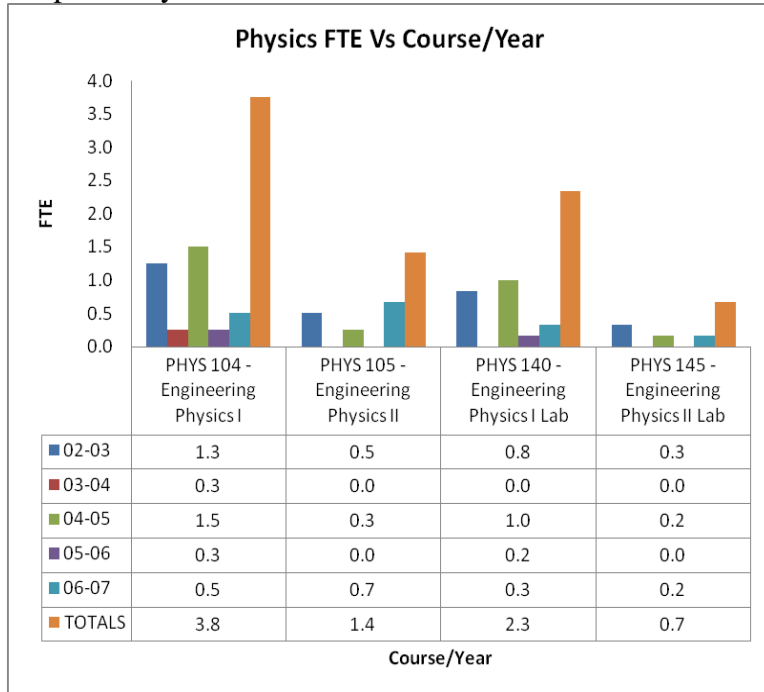
Graph 1: Chemistry FTE



Graph 2: Math FTE



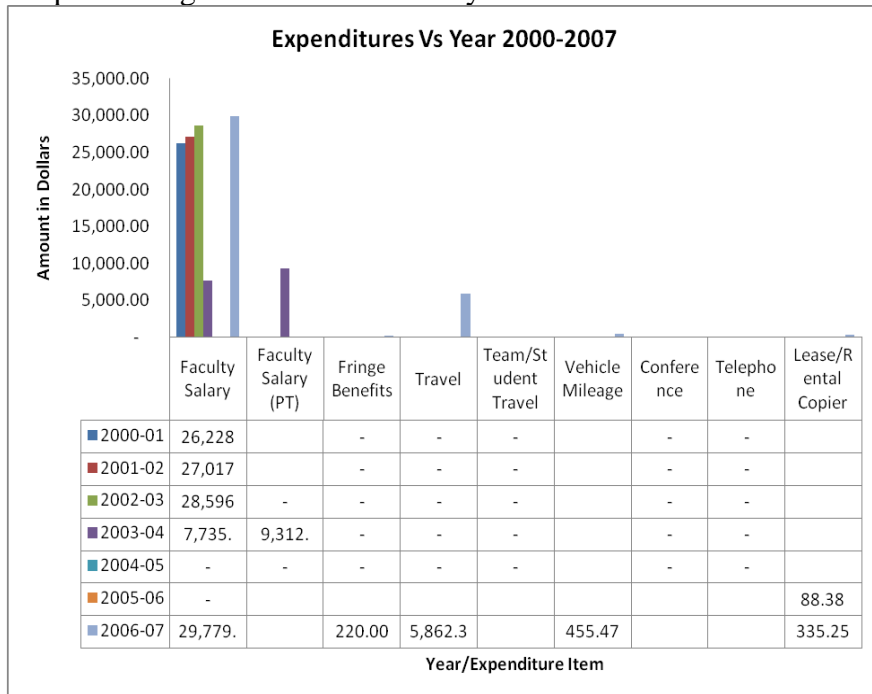
Graph 3: Physics FTE



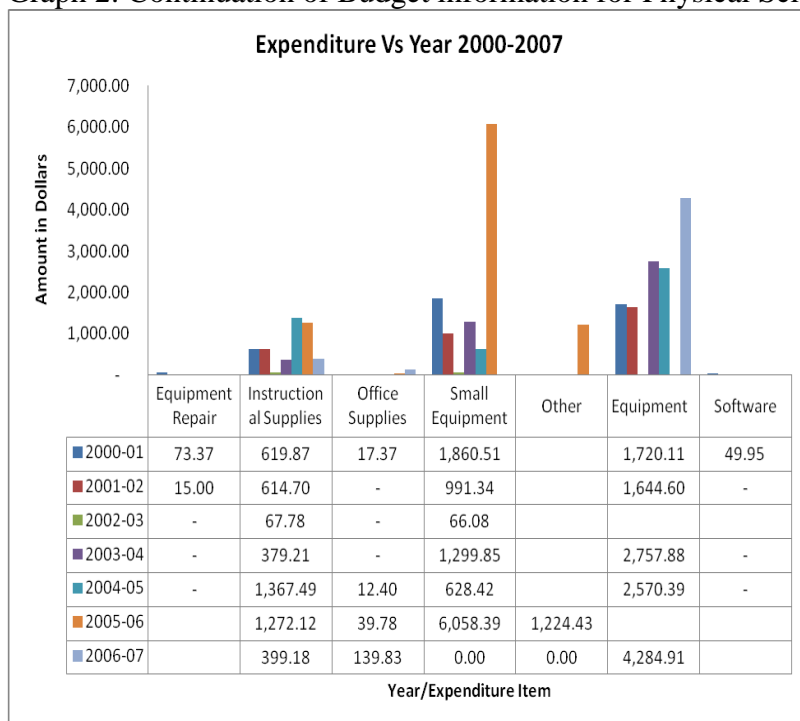
Cost information for the last five years:

The budget information shown in the graphs below is for the entire Physical Science courses (Physics, Chemistry, and Physical Science) only and is for Chanute Campus.

Graph 1: Budget information for Physical science



Graph 2: Continuation of Budget information for Physical Science



Cost Breakdown

Total Budgeted Amount = \$ 212,109.28

Total Expended Amount = \$ 165,806.34

Total FTE (Chemistry and Physics combined) = 358.9

Cost per FTE = \$ 461.98

Note: the data represented here is for Chanute campus only and no Ottawa data was included. Budgetary information for mathematics was also not included.

Section 4: Faculty

The Chemistry Emphasis faculty during the previous five years consisted of 8 different full-time instructors and 14 part-time instructors. During this period, full-time faculty taught 31% and part-time faculty taught 69% of the Chemistry Program courses.

Table 1: Full-time and Part-time Instructors.

Full-time Instructors	Part-time Instructors
Charles Babb	Joshua Adams
Brian Foreman	Rex Babcock
Luka Kapkiai	Homer Berrick
Pamela Oliver	Robert Boldra
Obie Pennington	Charles Bowers

Walid Shihabi	Richard Brown
Carolyn Vaverka	Brian Carlson
Steven Yuza	James Carlson
	Keith Goering
	Douglas Holub
	Duane McCarty
	James McVay Jr
	James McVay III
	Kristi Miller
	Terry Tinich
	Timothy West

Sections 5 & 6 to be completed by the Department and the Review Committee:

Section 5: SWOT analysis of program based on above information

Strengths

- The courses being offered under this program are transferring smoothly to most of the regents universities especially Emporia State University and Kansas University without a problem.
- We are able to offer science courses to non majors
- The new science software for Chemistry will be a valuable tool for instruction of lab experiments of which we do not have enough apparatus or equipments.
- The computers available at A&P Lab acquired by Sarah McCoy through an HP grant are loaded with software that can be used in our Chemistry and Physics labs to collect and analyze data.
- Regaining stability.

Weaknesses

- The enrollments numbers for Physics and Chemistry are low
- There are no science scholarship opportunities available to help increase our enrollments
- As much as our labs serve the purpose, we still need some improvements.
- Past turnover in instructors.

Opportunities

- NSF grants could be a boost for our programs (equip our lab and offer scholarships).
- Find out about internships opportunities in the local industries (such as Ash Grove, Chanute Manufacturing, and etc. for our students.
- Market our science programs in the local high schools.

Threats

- Outside universities that do not accept our courses.
- Number of students interested in these areas.

Section 6: Justification/Recommendations for Program

- Should the program be maintained, strengthened, diminished or removed and why
- Additional recourses required needed to maintain or strengthen, recommendations for resources if diminished or removed.
- All recommendations should be tied to outcomes assessment results.