

Program Review - 2012

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

Program Instructors: Luka Kapkiai, Charles Babb, and Nathan Stanley

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.

A. Current mission statement of program

The Associate of Science degree in Chemistry and Pre-Chemical Emphasis upholds all the missions and purpose of Neosho County Community College (NCCC). The Chemistry and Pre-Chemical Engineering Emphasis at NCCC has several missions:

- To prepare chemistry majors for higher-level courses and completion of a four-year chemistry degree.
- To provide health professional students with a firm scientific foundation to build upon.
- To provide non-science majors with an understanding of basic chemical concepts and how chemistry affects their lives.
- To provide all students with an understanding of the process of science and laboratory techniques.
- To teach students to think critically, use logic and reasoning, and solve problems.

B. How the program contributes to the purposes of NCCC

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 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 based on the course learning outcomes. 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 courses in the emphasis program 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 physical science 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 records of supplies (such as lab consumables and apparatus) are 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 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

1) Program sheet (attach a copy of the program sheet(s))

Chemistry and Pre-Chemical Engineering

Associate of Science

The Associate of Science with an emphasis in Chemistry and Pre-Chemical Engineering at NCCC provides the general education courses normally taken in the first two years at a four-year college or university, with major in chemistry or chemical engineering. Study in college chemistry, calculus, and physics will prepare the student for the junior level at four-year universities. Furthermore, it will equip a student with the basic chemistry techniques and technology used in chemistry labs.

Prerequisites
The student will need to demonstrate proficiencies in reading, English, and mathematics based on the COMPASS assessment test, ACT or SAT scores, or by taking the recommended/required classes. Some of the courses in this curriculum have specific prerequisites.

General Education (GE) Courses
In order to graduate with a college degree, all students are required to take certain general education courses. These include English composition, speech, wellness, science, art and humanities, mathematics, computer systems, and social and behavioral science.

Program Core Courses
CHEM 215/216 College Chemistry I/Lab, CHEM 225/226 College Chemistry II/Lab, MATH 150 Analytic Geometry and Calculus I, MATH 155 Analytic Geometry and Calculus II, PHYS 104/140 Engineering Physics I/Lab, PHYS 105/145 Engineering Physics II/Lab.

Program Elective Courses
For biochemistry: BIOL 251/252 Biology I/Lab, BIOL 255/256 Biology II/Lab.
For chemical engineering: MATH 253 Analytic Geometry and Calculus III.

Program Outcomes

1. Demonstrate an understanding of chemical calculations and in solving stoichiometry problems.
2. Describe atomic structure, periodicity, chemical reactions, chemical bonds and name chemical compounds.
3. Define matter and demonstrate an understanding of the properties of solids, liquids, and gases in relation with energy.
4. Define and classify acids and bases and the different reactions they undergo.
5. Demonstrate an understanding in measuring; mechanics of motion and thermal properties of matter by application in problem solving.
6. Demonstrate an understanding of electricity, magnetism, and optics by application in problem solving.
7. 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.

Course Sequence
The listing that follows is a recommended sequence of courses for full-time students. The student should consult with an advisor for information specific to their academic situation.


Recommended Sequence of Courses

(Fall) Semester I	Cr Hrs
CHEM 215 College Chemistry I	3
CHEM 216 College Chemistry I lab	2
PSYC 100 First Year Seminar	1
ENGL 101 English Composition I	3
MATH 150 Analytic Geometry and Calculus I*	5
CSIS 100/130 Computer Concepts and Applications or Intro Computer Information Systems	3
Total	17
(Spring) Semester II	
CHEM 225 College Chemistry II	3
CHEM 226 College Chemistry II lab	2
MATH 155 Analytic Geometry and Calculus II	5
ENGL 289 English Composition II	3
PSYC 155 General Psychology	3
Total	16
(Fall) Semester III	
PHYS 104 Engineering Physics I**	4
PHYS 140 Engineering Physics I Lab**	1
COMM 207 Fundamentals of Speech	3
HPER 150 Lifetime Fitness	1
Arts/Humanities Elective	3
Social/Behavioral Science Elective	3
Arts/Humanities Elective	3
Total	18
(Spring) Semester IV	
PHYS 105 Engineering Physics II	4
PHYS 145 Engineering Physics II Lab	1
Biological Science and Lab	5
Social/Behavioral Science Elective	3
Arts/Humanities Elective	3
Total	16
Total Program Credits	67

*Assuming the student has passed the equivalent of College Algebra, if not, enroll in MATH 125 College Algebra and Trigonometry (5cr), or MATH 122 Plane Trigonometry (3cr) instead.

**The student could enroll in PHYS 100/130 Introductory College Physics I/Lab (5cr) instead. However, PHYS 104/140 Engineering Physics I/Lab (5cr) are strongly recommended.

For more information contact:
Program Advisor
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In accordance with the 2010-2012 catalog

2) Courses in Program

- a. CHEM 215 formerly CHEM 125 – College Chemistry I
- b. CHEM 216 formerly CHEM 126 – College Chemistry I Lab
- c. CHEM 225 formerly CHEM 135 – College Chemistry II

- d. CHEM 226 formerly CHEM 136 – College Chemistry II Lab
- e. PHYS 104 – Engineering Physics I
- f. PHYS 105 – Engineering Physics II
- g. PHYS 140 – Engineering Physics I lab
- h. PHYS 145 – Engineering Physics II Lab
- i. MATH 150 – Analytic Geometry and Calculus I
- j. MATH 155 – Analytic Geometry and Calculus II

3) Assessment methods for the course and their influence with program level data Courses in the Chemistry and Pre-chemical Engineering are assessed consistent with the specific courses taught. Most of the course assessments consisted of regular examinations. As such, program assessments results were assembled from individual course assessments.

4) Program outcomes and matrix (attach copies of the program outcomes and matrices for the last five years)

Course Number	Course Name	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CHEM 215	College Chemistry I	CO 1,3	CO 2	CO 2,4,7,8	CO 6								
CHEM 216	College Chemistry I Lab							CO 1,2	CO 3				
CHEM 225	College Chemistry II			CO1,4,8		CO 2	CO 3,5	CO 9					
CHEM 226	College Chemistry II Lab							CO 1,2	CO 3				
PHYS 104	Engineering Physics I									CO 1,2	CO 1,2	CO 2	CO 1,2
PHYS 140	Engineering Physics I Lab							CO 1				CO 2	CO 3
PHYS 105	Engineering Physics II									CO 1,2	CO 1,2	CO 2	
PHYS 145	Engineering Physics II Lab							CO 1				CO 2	CO 3
MATH 150	Analytic Geometry & Calculus I											CO 1-5	CO 1-5
MATH 155	Analytic Geometry & Calculus II											CO 1-9	CO 1-9

Program Outcomes Grand Totals

<u>Academic Year</u>	<u>CRSE OTC</u>	<u># STDNTS ASSESSE</u>	<u>WEIGHTED</u>	<u>GOALS</u>	<u>GOALS UNMET</u>	<u>GOALS</u>	<u>GOALS UNMET</u>
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	<u>M</u>	<u>D</u>	<u>AVERAGE</u> <u>%</u>	<u>MET</u>	<u>T</u>	<u>MET</u> <u>%</u>	<u>%</u>
07-08	67	741	85	78	30	72 %	28 %
08-09	67	1094	80	70	48	59 %	41 %
09-10	67	1158	82	93	45	67 %	33 %
10-11	67	1000	79	68	47	59 %	41 %
11-12							

Courses taught in the Chemistry and Pre-Chemical emphasis had different set goals. Chemistry and Physics courses had a set goal of 70 % while Math courses had a set goal of 80 %. During the assessment period covered in this review, students were able to meet the set goal per the specified courses and therefore meeting the learning course outcomes. However, not all of the goals were met as shown by the percentages of the goals unmet.

5) Assessments

1) Results of assessments

Course Level Analysis

Course Outcome	CHEM 215					CHEM 216			
	07-08	08-09	09-10	10-11		07-08	08-09	09-10	10-11
1	76	83	80	82		89	98	91	91
2	79	85	80	77		85	88	87	74
3	71	81	79	77		88	84	84	87
4	74	82	82	76					
5									
6	70	83	81	69					
7	65	87	81	70					
8	69	80	78	59					

Course Outcome	CHEM 225					CHEM 226			
	07-08	08-08	09-10	10-11		07-08	08-09	09-10	10-11
1	58	60	87	92		100	100	72	92
2	58	54	91	81		75	83	75	97
3	63	80	83	70		81	75	84	93
4	60	52	83	56					

5	64	90	88	86				
6								
7								
8	67	65	35	79				

Course Outcome	PHYS 104				PHYS 140			
	07-08	08-08	09-10	10-11	07-08	08-09	09-10	10-11
1	85	65	68	60	83	86	80	78
2	79	73	71	80	80	72	68	83
3					83	80	80	100
4								

Course Outcome	PHYS 105				PHYS 145			
	07-08	08-08	09-10	10-11	07-08	08-09	09-10	10-11
1	85	66	63		75	73	65	
2	81	79	75		96	71	68	
3					95	88	80	
4								

Course Outcome	MATH 150				MATH 155			
	07-08	08-08	09-10	10-11	07-08	08-09	09-10	10-11
1	72	76	87	83	87	67	68	75
2	86	84	89	80	98	72	93	76
3	89	79	78	75	81	61	66	
4	85	71	82	81	88	73	61	74
5	91	73	83	77	90	76	88	75
6					83	75	82	74
7					94	81	84	
8					86	75	86	79

9					85	84	90	
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Note: Color coded region indicate no information provided or that particular outcome was not assessed.

2) General Education Assessment Analysis:

Of all the courses taught in the Chemistry and Pre-Chemical engineering emphasis, only CHEM 215 and CHEM 216 are tied to the general education assessment outcomes. CHEM 215 course outcomes 1 – 8 feeds to Analytical thinking and so does CHEM 216 course outcomes 2 and 3.

3) Changes made to instruction, curriculum or outcomes as a result of assessment

The use of essay type problems instead of multiple choices in chemistry and physics courses tests/exams has been explored with better results. The recent statewide core outcomes meetings will result to the adoption of “new course outcomes”.

6) Transferability of Program and Program Courses or “straight to work” numbers including transfer GPA in major

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 215	CHEM 184	CHM 210	CH 123	CHEM 215	CHEM 211	CHEM 120	CHEM 151
CHEM 216	CHEM UL	CHM 210	CH 124	CHEM 216	CHEM 211	CHEM 120L	CHEM 151
CHEM 225	CHEM 188	CHM 230	CH 126	CHEM 225	CHEM 212	CHEM 122	CHEM 152
CHEM 226	CHEM UL	CHM 230	CH 127	CHEM 226	CHEM 212	CHEM 122L	CHEM 152
PHYS 104	PHSX 211	PHYS 213	PH 190	PHYS 104	PHYS 313	PHYS 211	PS 281
PHYS 105	PHSX 212	PHYS 214	PH 393	PHYS 105	PHYS 314	PHYS 212	PS 282
PHYS 140	PHSX 211	PHYS 213	PH 191	PHYS 130	PHYS 315	PHYS 211L	LDE
PHYS 145	PHSX 212	PHYS 214	PH 394	PHYS 131	PHYS 316	PHYS 212L	LDE
MATH 150	MATH 121	MATH 220	MA 161	MATH 150	MATH 242	MATH 234	MA 151
MATH 155	MATH 122	MATH 221	MA 262	MATH 155	MATH 243	MATH 235	MA 152

Note: Highlighted regions indicate that changes have occurred from the last program review. In particular, course equivalencies information was missing from Wichita State University. This information is now available and has been added.

7) Efforts to stay current in curriculum

The faculty stays current in the curriculum by participating in statewide core competency meetings in addition to:

Nathan Stanley – took professional development graduate courses in teaching methods and uses online math homework programs such as WebAssign and MYMathlab

Charles Babb – participated on professional development on collaborative learning and has implemented on college algebra. Currently reviewing math text books

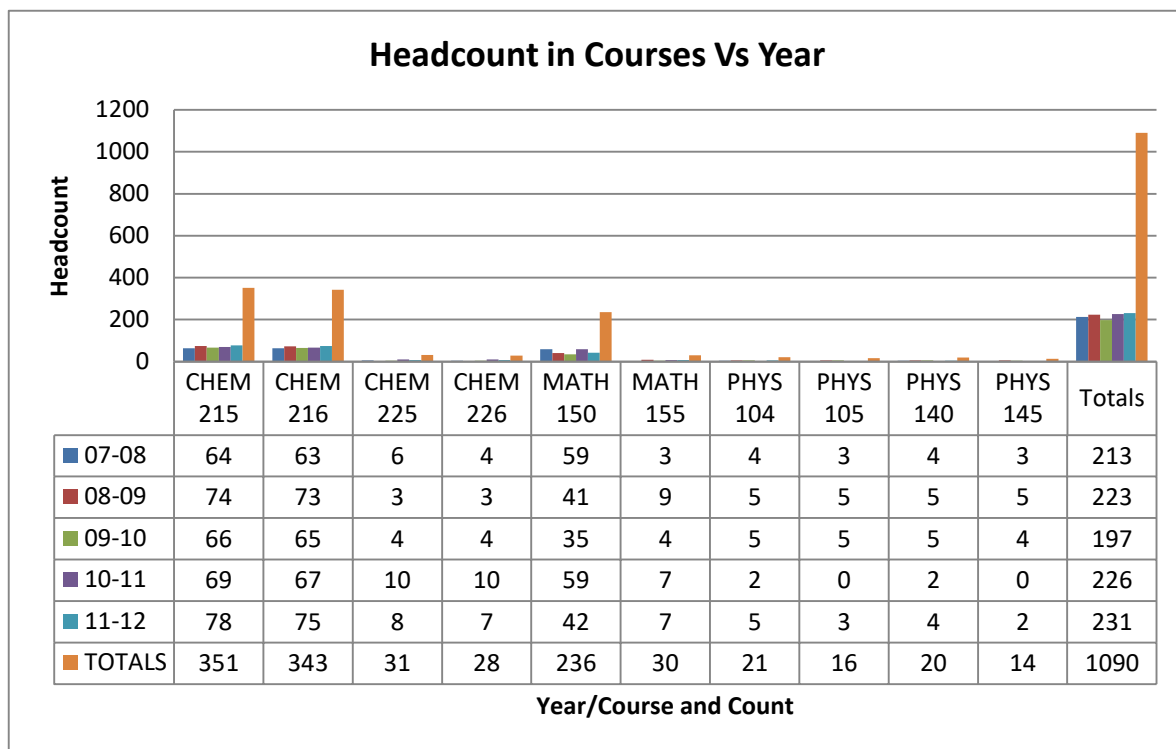
Luka Kapkiai – participated in New Faculty Training Conference in Physics, attended and presented at Association of American Physics Teachers and is taking graduate courses towards a degree in Education.

Section 3: Data – Enrollment and Costs

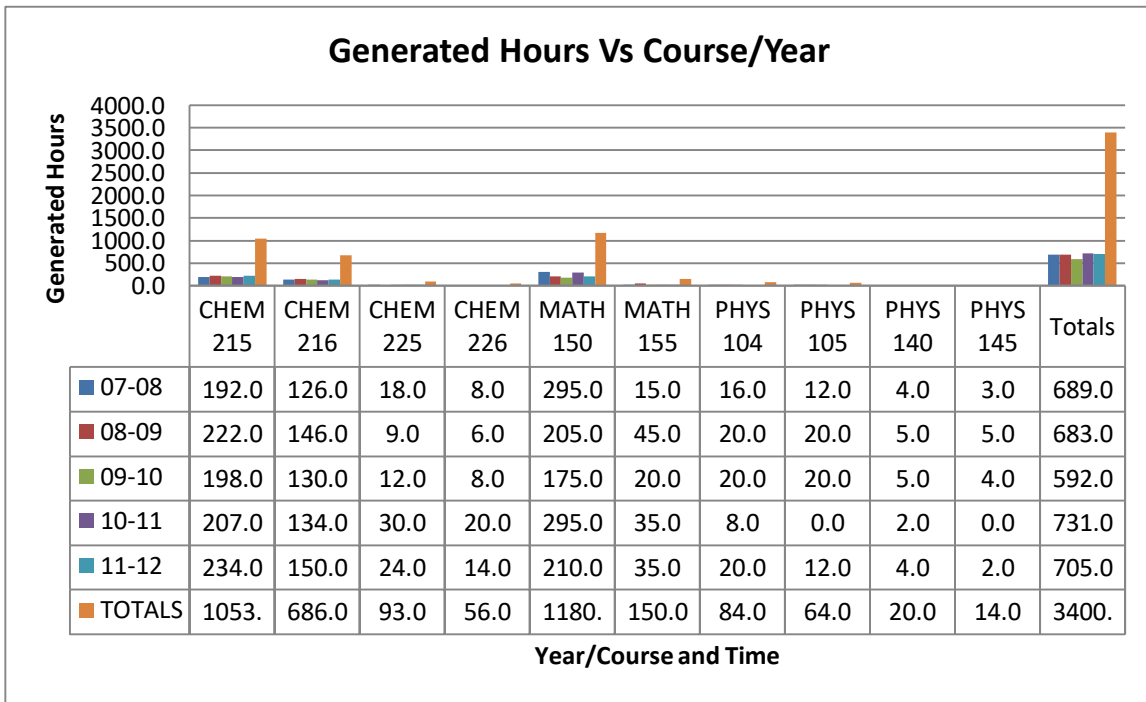
1) Each Course

Headcount

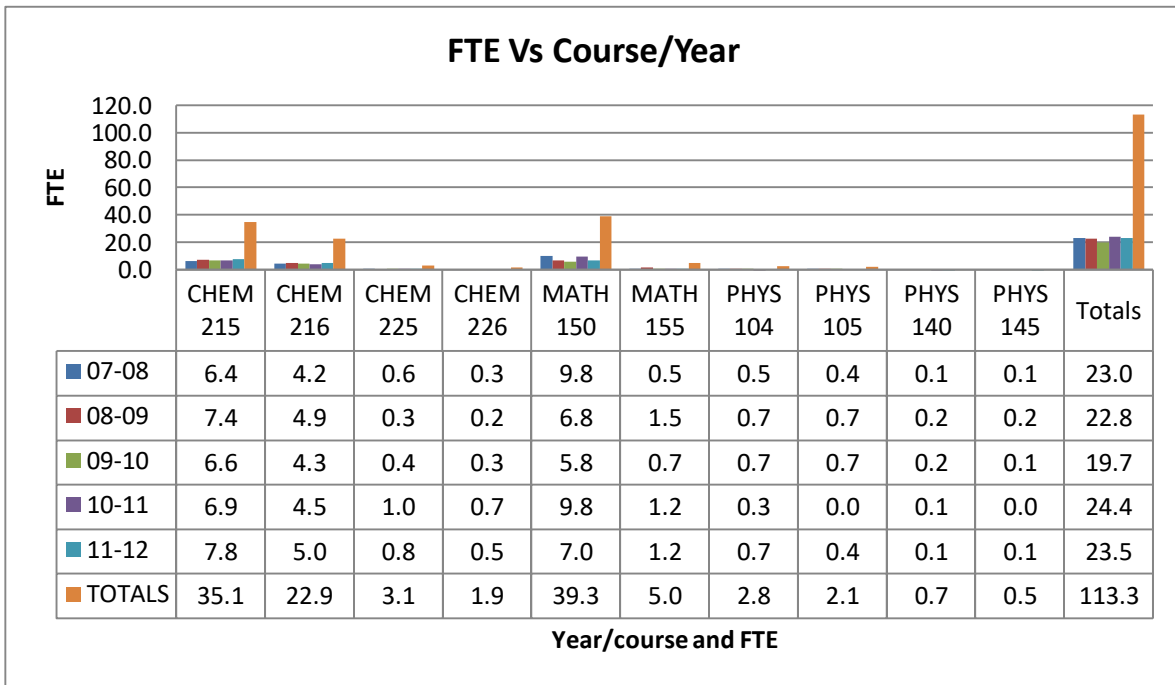
The graph shown below indicates the number of students enrolled in the specified courses within the chemistry and pre-chemical engineering emphasis at the Chanute and Ottawa campuses. Enrollments has remained relatively constant over the years



Credit hours generated: The graph presented below shows the total generated hours for the specified courses taught in both the Chanute and Ottawa campuses in the Chemistry and Pre-chemical Engineering emphasis.

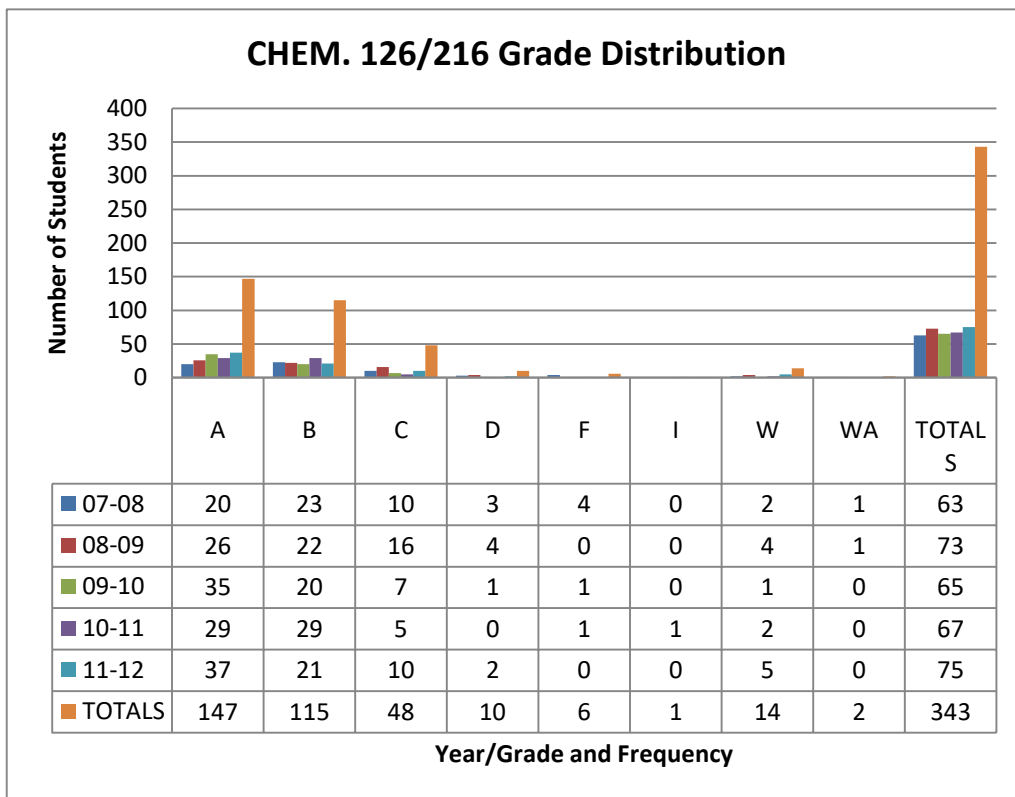
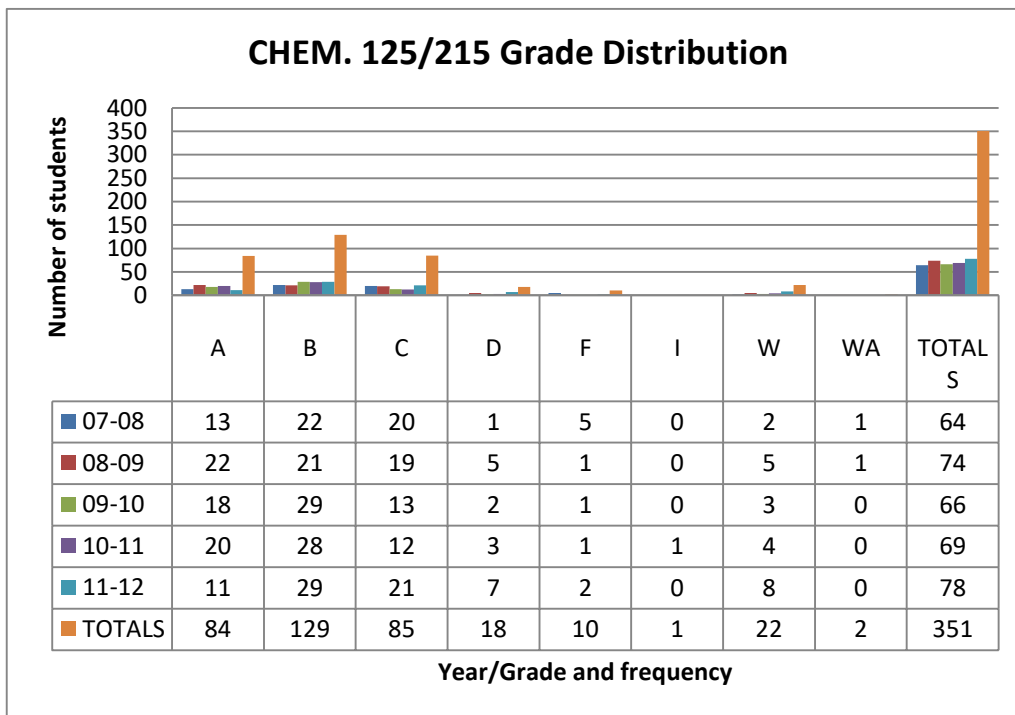


FTE

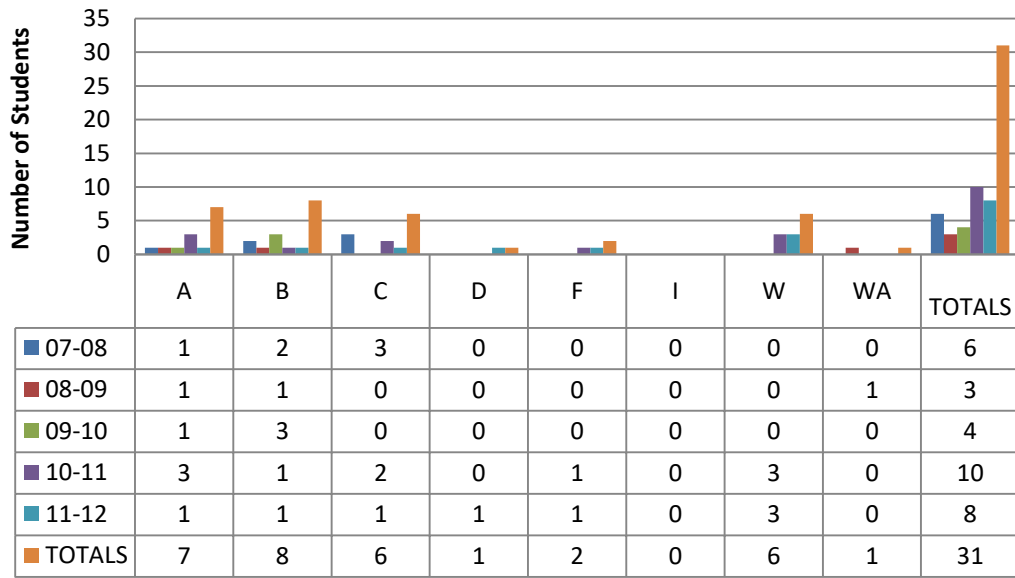


Grade distribution

The following graphs show the grade distributions for the courses in the Chemistry and pre-chemical Engineering emphasis.

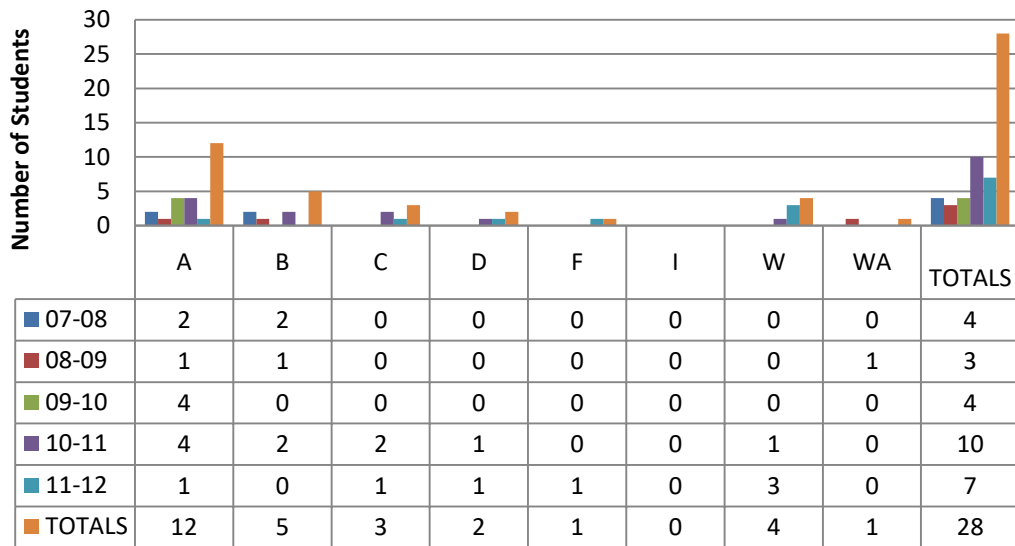


CHEM. 135/225 Grade Distribution



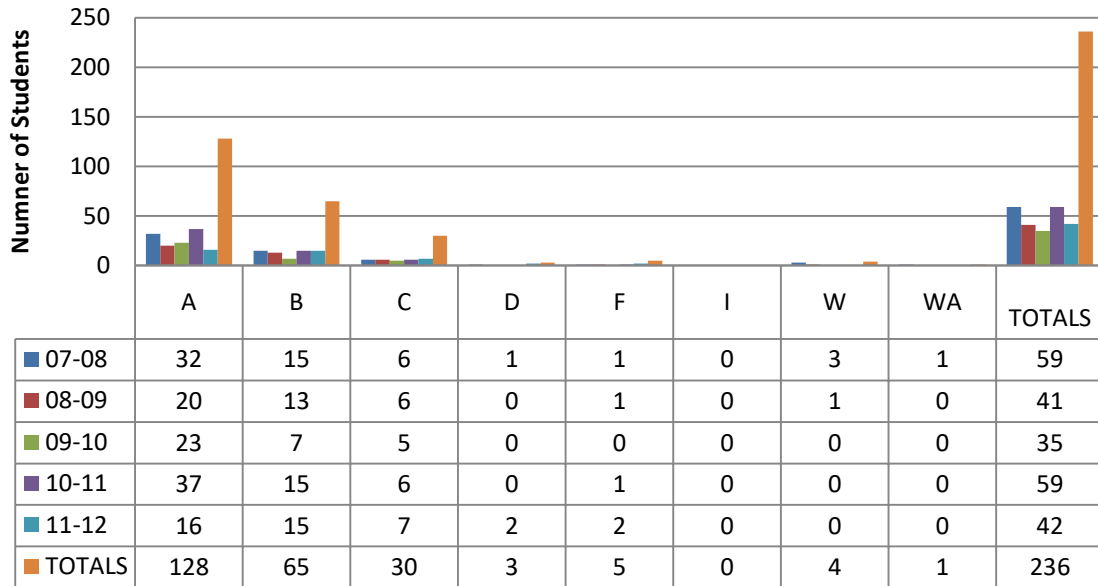
Year/Grade and Frequency

CHEM. 136/226 Grade Distribution



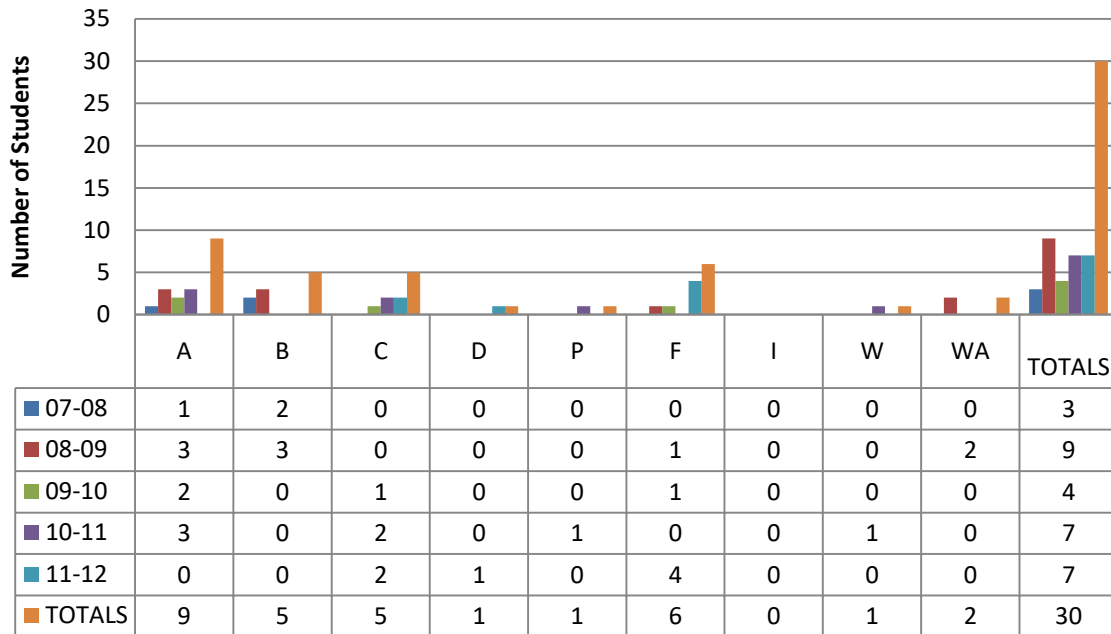
Year/Grade and Frequency

MATH 150 Grade Distribution



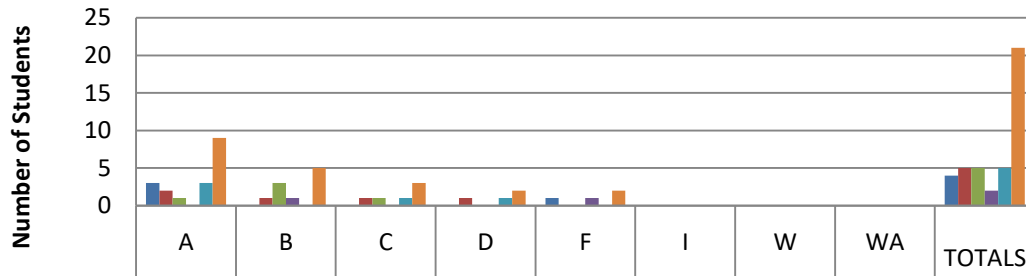
Year/Grade and Frequency

MATH 155 Grade Distribution



Year/Grade and Frequency

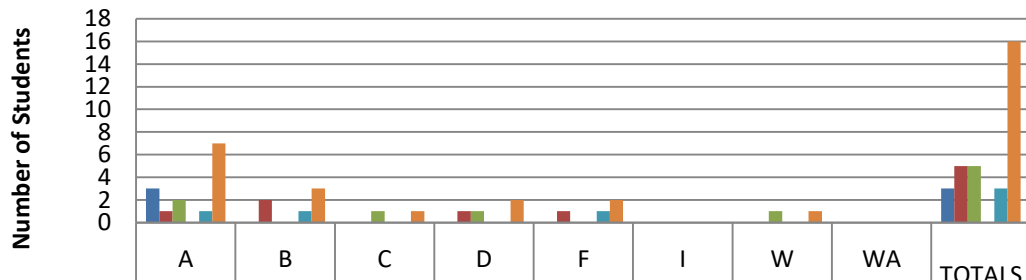
PHYS 104 Grade Distribution



	A	B	C	D	F	I	W	WA	TOTALS
07-08	3	0	0	0	1	0	0	0	4
08-09	2	1	1	1	0	0	0	0	5
09-10	1	3	1	0	0	0	0	0	5
10-11	0	1	0	0	1	0	0	0	2
11-12	3	0	1	1	0	0	0	0	5
TOTALS	9	5	3	2	2	0	0	0	21

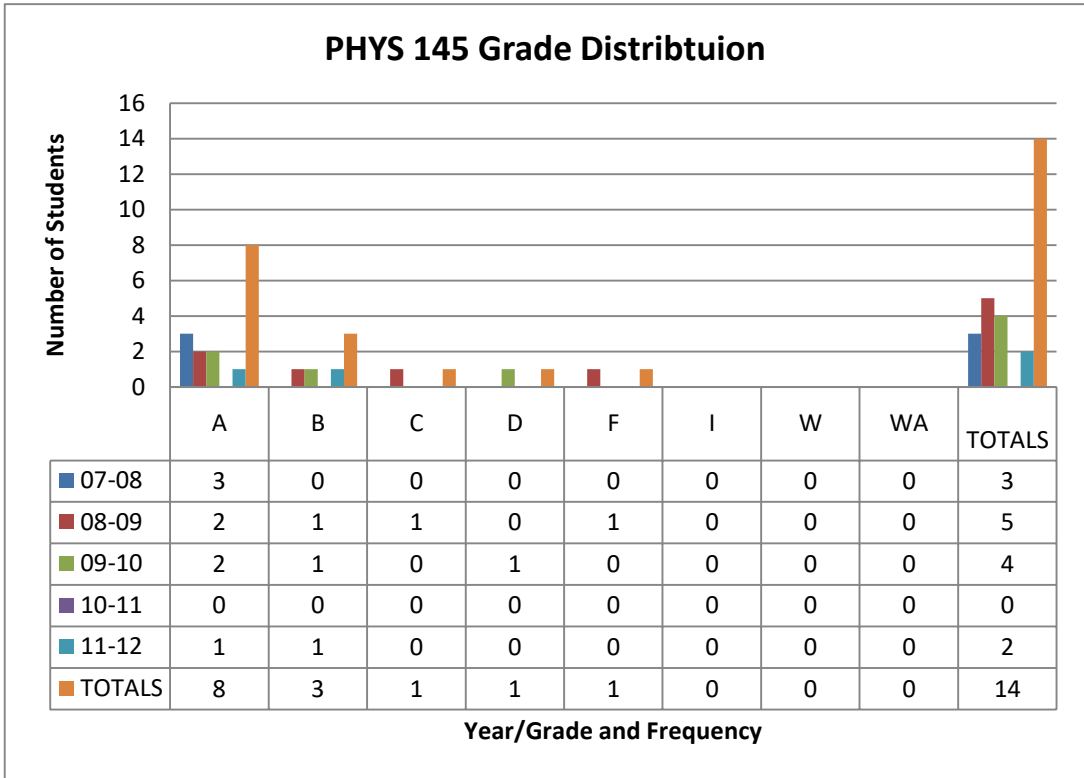
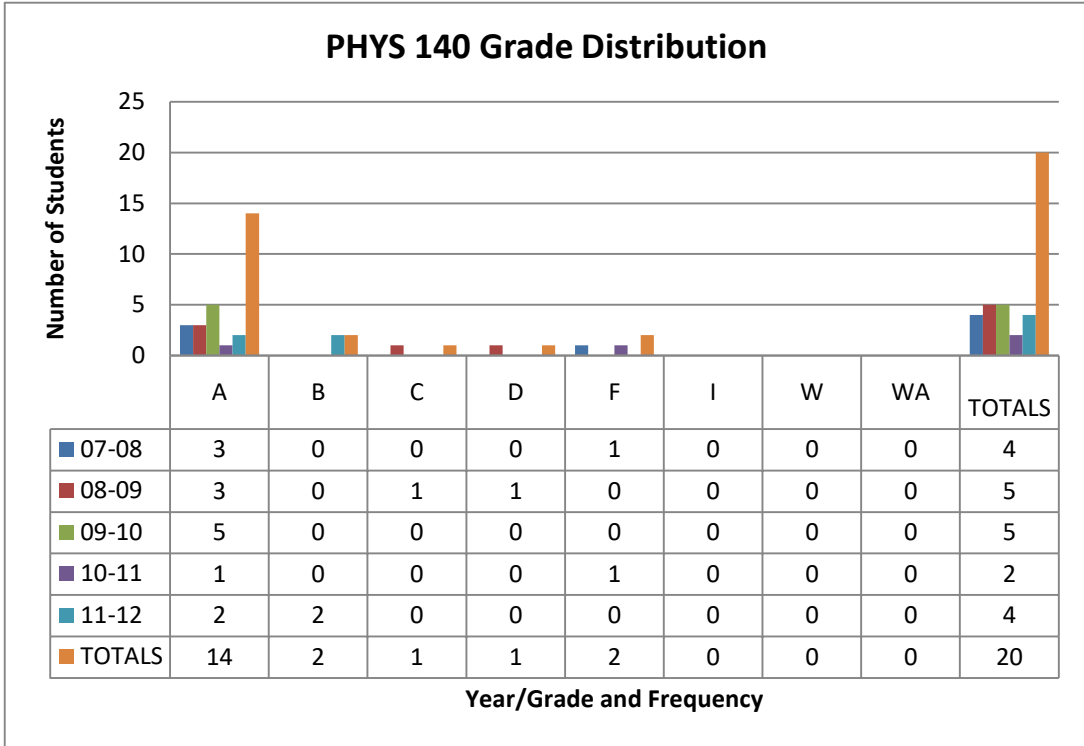
Year/Grade and Frequency

PHYS 105 Grade Distribution



	A	B	C	D	F	I	W	WA	TOTALS
07-08	3	0	0	0	0	0	0	0	3
08-09	1	2	0	1	1	0	0	0	5
09-10	2	0	1	1	0	0	1	0	5
10-11	0	0	0	0	0	0	0	0	0
11-12	1	1	0	0	1	0	0	0	3
TOTALS	7	3	1	2	2	0	1	0	16

Year/Grade and Frequency



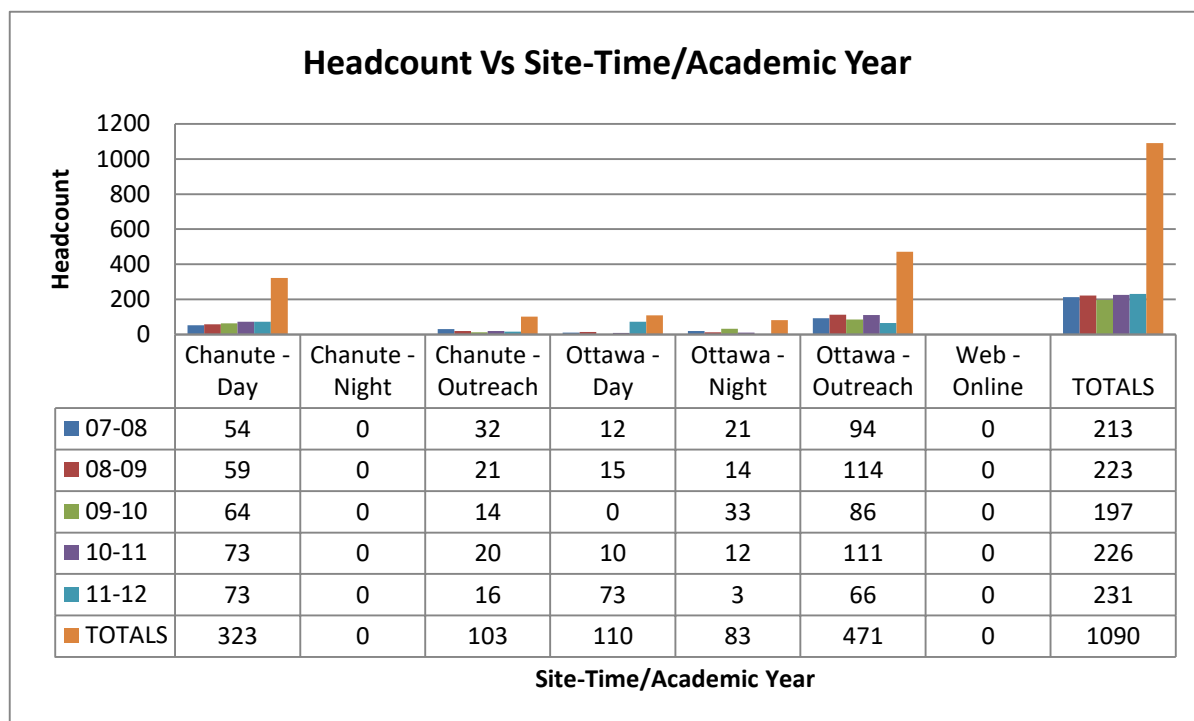
Withdraw numbers and percentages

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

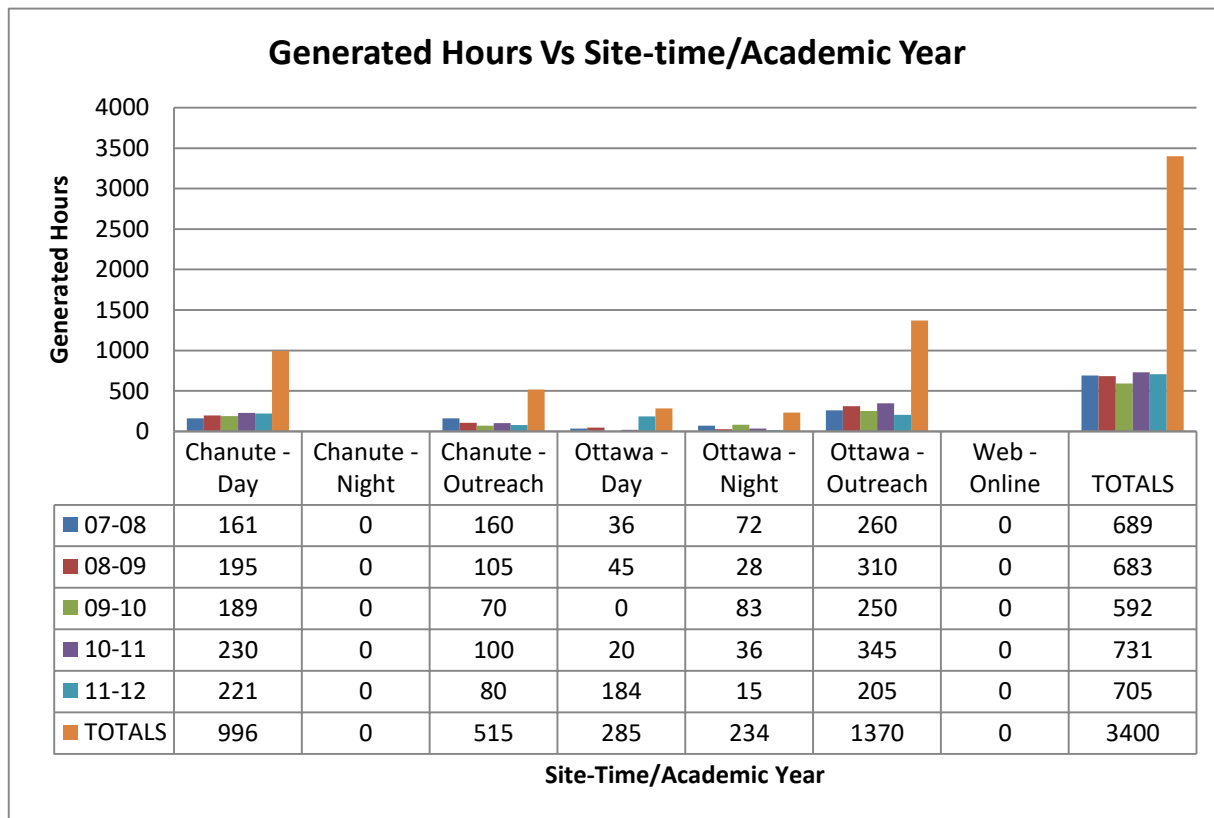
Course	Withdrawals	% Withdrawn
CHEM 125/215	24	7 %
CHEM 126/216	16	5 %
CHEM 135/225	7	23 %
CHEM 136/226	5	18 %
PHYS 104	0	0 %
PHYS 105	1	6%
PHYS 140	0	0%
PHYS 145	0	0%
MATH 150	5	2 %
MATH 155	3	10 %

2) Enrollment by site, day/night

The graph shown below indicates the number of students enrolled in courses within the chemistry and pre-chemical engineering emphasis at the Chanute and Ottawa campuses. In the Chanute campus, students are enrolled for their courses during the day. In the Ottawa campus students are enrolled in courses both during the day and night. There are a good number of students enrolled in the outreach sites for both Chanute and Ottawa campuses. However, Ottawa campus has the most students enrolled in outreach sites.



The graph shown below indicates the number of generated hours within the chemistry and pre-chemical engineering emphasis at the Chanute and Ottawa campuses for both day and night. There are a good number of generated hours in the outreach sites for both Chanute and Ottawa campuses.



3) Students in major

For the last five years the following 13 students had indicated as working towards an emphasis in Chemistry or Pre-Chemical Engineering

Names of students removed.

Students with Chemistry as their emphasis by year

2007	CHEM	Names of students have been removed.
2007	CHEM	
2008	CHEM	
2008	CHEM	
2009	CHEM	
2009	CHEM	
2009	CHEM	
2009	CHEM	
2010	CHEM	
2010	CHEM	
2010	CHEM	
2011	CHEM	
2011	CHEM	
2011	CHEM	
2011	CHEM	
2011	CHEM	
Grand Count		16

4) Graduates/certificates or stated goal

STUDENT	DEG CODE	DATE DEGREE CONFERRED
Rifenbark, Glenn A	AGS	12/15/2007
Carson, Montana D	AS	5/15/2010
Price, Jeffrey A	AS	5/15/2011

Note: From the office of institutional research, Rifenbark never was a NCCC Chemistry emphasis student when the degree was conferred. He last attended NCCC in the Fall of 1996. As such the registrar must have awarded degree based on transfer hours.

B. Cost information for the last five years:

The budget information provided below is for Chanute campus (Physical Science only). Biology and math instructors have their own budgets.

1) Yearly budget – this data include cost for full-time instructor(s)

Academic Year	2008-2009	2009-2010	2010-2011	2011-2012
Physical Science	\$33,205.00	\$34,973.00	\$35,825.00	\$37,757.00
Travel	\$2,577.00	\$1,600.00	\$3,900.00	\$3,900.00
Vehicle Mileage	\$375.57	\$376.00	\$400.00	\$77.50
Postage	\$5.00	\$20.00	\$20.00	\$20.00
Advertising	\$50.00	\$0.00	\$20.00	\$10.00
Telephone	\$10.00	\$0.00	\$0.00	\$0.00
Copier				
Lease/Rental	\$350.00	\$395.65	\$400.00	\$284.18
Instructional Supplies	\$845.00	\$263.19	\$694.70	\$399.33

Equipment Repair	\$0.00	\$0.00	\$0.00	\$30.00
Office Supplies	\$75.00	\$11.20	\$26.36	\$20.00
Equipment	\$9,460.00	\$0.00	\$0.00	\$151.95
Total Budgeted	\$46,952.52	\$37,638.04	\$41,276.06	\$42,649.96

Budgeted Amount = \$ 168,516.58
Total Expenditure = \$ 162,600.11

2) Adjunct instructors

$$220 * 425 = \$ 93,500$$

Note: The cost of part-time instructors was calculated based on the number of credit hours (220) taught by par-time instructors for the review period.

3) Cost per FTE (FTE for NCCC is calculated by total credit hours generated by a course/program for an entire academic year divided by 30), please do an analysis by course and then a total for the program.

The FTE graph provided in section 3 provides the necessary FTE data for the Chemistry and Pre-Chemical Engineering program

Course	CHEM 215	CHEM 216	CHEM 225	CHEM 226	PHYS 104	PHYS140	PHYS 105	PHYS 145	MATH 150	MATH 155	Totals
FTE	35.1	22.9	3.1	1.9	2.8	0.7	2.1	0.5	39.3	5.0	113.3

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.

Full-time and Part-time Instructors.

Full-time Instructors	Part-time Instructors
------------------------------	------------------------------

Charles, Babb H	Babcock, Rex E
Campbell, Michael T	Botts, Kelci R
Gort, Benjamin A	Brown, Richard P
Kapkiai, Luka K	Burnett, Nicole A
Obie Pennington	Carlson, Brian M
Stanley, Nathan L	Hassler, Kristopher L
	Jones, Sheila Diane
	McCarty, Duane E
	Miller, Kristi K
	Tinich, Terry J
	Wika, Brian S

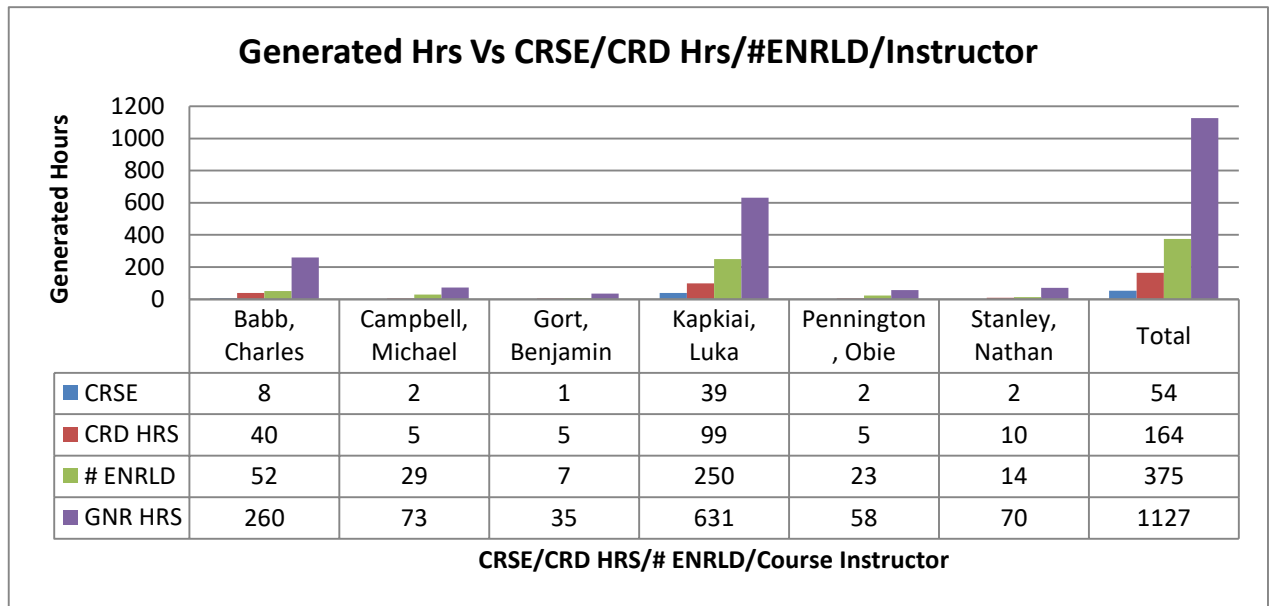
A. Number of full and part-time instructors

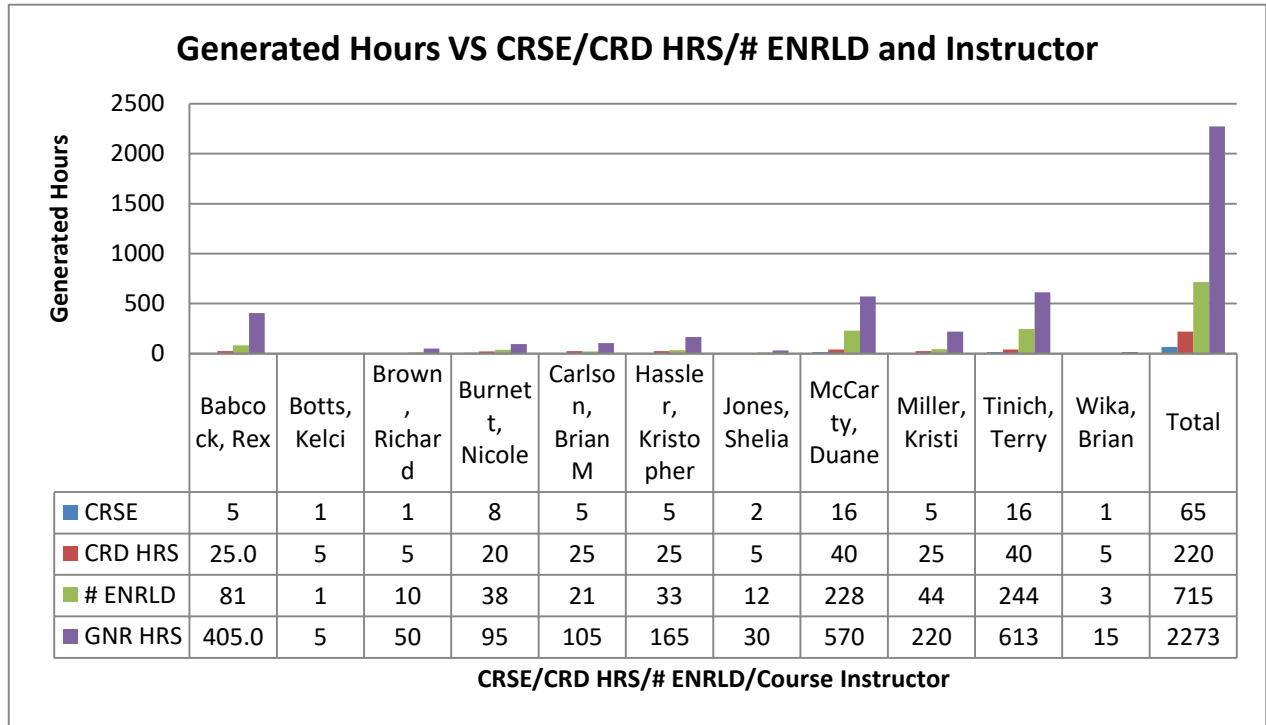
The Chemistry and pre-chemical emphasis faculty during the last five years consisted of 6 different full-time instructors and 11 part-time instructors.

B. Percentage of courses taught by full and part-time instructors

During this review period, full-time faculty taught 45% of the courses while part-time faculty taught 55% of the courses. This happens to some improvement compared to the previous program review period 2007 when 31 % of the courses were taught by full-time faculty members.

Faculty	Courses taught	%
Full-time	54	45
Part-time	65	55
Total	119	100





C. How faculty stay current in discipline
See section 2 number seven.

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

Section 5: SWOT

A. SWOT analysis of **Program** based on above information. Include changes made since the last program review (see last SWOT analysis).

- 1) Strengths
- 2) Weaknesses
- 3) Opportunities
- 4) Threats

B. SWOT analysis of the **Assessment Data** based on the above information. Include changes made since the last program review (see last SWOT analysis). Please separated by course, program, and (where appropriate) general education levels.

- 1) Strengths
- 2) Weaknesses
- 3) Opportunities
- 4) Threats

Section 6: Justification/Recommendations for Program

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