

**Bryan College of Health Sciences
SCHOOL OF HEALTH PROFESSIONS**

**Assessment Report for
Bachelor of Science Degree in Biomedical Sciences
2016-2017**

Bryan College of Health Sciences Mission

The mission of Bryan College of Health Sciences is to provide education in the health professions emphasizing clinical and academic excellence through collaboration with Bryan Health System and the healthcare community.

Bryan College of Health Sciences Goals

The goals of Bryan College of Health Sciences are to prepare graduates who:

- Are qualified to practice in entry level, mid-level and advance practice roles in diverse health care environments;
 - Are critically aware of their own individuality;
- Maintain a clear understanding of professional scope of practice.
- Value life-long learning as a means of personal and professional growth;
 - Participate as responsible citizens within the community; and
- Are capable to meet the healthcare needs of an ever-changing society.

Philosophy of Biomedical Sciences Program

The faculty of Bryan College of Health Sciences, Biomedical Sciences Program, believes that:

The baccalaureate degree program in biomedical sciences exists to prepare graduates to pursue graduate study in a wide range of health related fields which contribute directly and indirectly to the delivery of quality health care and services. Educational preparation for advanced study in a health related field is built on an in-depth, integrated study of natural sciences and general education concepts. Knowledge and skills require a high level of critical thinking and are developed through didactic and field experiences related to the field of study.

Students and graduates are guided by legal and ethical standards, and require communication and interpersonal skills which promote positive interaction with others in the educational and healthcare environment. They critically evaluate scientific theories, gain competence in both theoretical and experimental science and recognize the contribution of science to society. Quality healthcare cannot exist without the academic framework and intellectual discipline inherent in the study of natural sciences.

Learning is a life-long, interactive process that builds on previous experience and ideally results in change in attitudes, beliefs, and/or behaviors. Learning occurs in a variety of environments, and involves the cognitive, affective and psychomotor domains. The learner is responsible for actively seeking knowledge both independently and under the supervision and guidance of qualified faculty.

Faculty are responsible as role models, mentors and teachers for providing a caring environment in which students are free to explore and develop personally, professionally and intellectually. The College provides educational opportunities within the multiple contexts of legal and ethical boundaries, political and economic forces, sociocultural influences, and spiritual and historical factors. This environment provides quality education, which develops critical thinking and contributes to meeting the emerging health care needs of society.

Learning Objectives:

Curriculum objectives for the student in the Biomedical Sciences program in the School of Health Professions at Bryan College of Health Sciences will be equipped to fulfill upon completion of the program.

The curriculum objectives are as follows:

1. Demonstrate knowledge of a wide spectrum of principles underlying biomedical sciences.
2. Apply principles of biology, chemistry, physics and mathematics to the study and interpretation of human health and disease.
3. Apply mechanisms of physiology and biochemistry to maintenance of body homeostasis.

4. Pursue scientific inquiry through research experiences and interpretation of findings.
5. Explain genetic processes and environmental influences on health and disease.
6. Utilize critical thinking to analyze and solve problems related to biomedical science.
7. Demonstrate preparedness for pursuing graduate study or employment in biomedical sciences or related fields.
8. Develop basic biomedical research skills through basic science and/or clinical research related to human health and disease.
9. Consider philosophical, ethical, political, legal and social issues associated with research in the biomedical sciences.

Measures and Methods for Assessing Learning Objectives:

A variety of measurement tools to assess student learning in the Biomedical Sciences program will be utilized to determine if students are meeting the expectations of stakeholders. Empirical evidence will be collected from rubrics for exams, papers, projects, and/or presentations from science courses and national, standardized examinations from selected science courses.

Anecdotal evidence of student learning in the Biomedical Sciences program will be collected from graduation and retention rates, student scores on entrance exams for health-related graduate schools (MCAT, PCAT, DAT, GRE), the number of graduates applying to graduate programs in a health-related field, number of graduates accepted into health-related graduate programs, the number of graduates obtaining employment in a health related field, exit surveys and alumni surveys.

Curriculum objectives paired with Assessment Strategies

Though many of our classes contain a mixed population of students, the biomedical sciences students' data will be extracted from the group and used for assessment. Students taking biomedical sciences classes, but pursuing other majors will not be included in the assessment data.

1. Demonstrate knowledge of a wide spectrum of principles underlying biomedical sciences.

a. Human Anatomy & Physiology Society Comprehensive Exam (HAPS):

The HAPS exam was administered to all students at the completion of the BIOS234 Anatomy and BIOS235 Physiology sequence.

Benchmark: Biomedical Sciences students' class average will be at or above the national mean (50% percentile).

*Results: Data were both separated and combined for all Biomedical Sciences students having previously completed the HAPS exam including students from 2014-15, 2015-16, and 2016-17. **Benchmark met**; our average is 2.8 points above the national mean.*

Biomedical Sciences Students' Class Average					
HAPS Exam					
	Total N=	Passing N =	Average of all Students	Average of Passing Students	National Average
2014-15	7	7	63.71	63.71	55.7 (n=687)
2015-16	4	4	56.25	56.25	51.79 (n=902)
2016-17	4	4	50.75	50.75	54.81 (n=1,309)
4-yr. totals	15	15	56.90	56.90	54.10

b. American Chemical Society Comprehensive Exam (ACS):

The ACS exam for General Chemistry was administered to all students at the completion of CHEM120 General Chemistry II.

Benchmark: Biomedical Sciences students' class average will be at or above the national mean (50% percentile).

*Results: Data were separated and combined for all Biomedical Sciences students having previously completed the ACS exam including students from 2013-14, 2014-15, 2015-16, and 2016-17. **Benchmark not met.***

Biomedical Sciences Students' Class Average				
ACS 2-semester General Chemistry Exam (2013 form)				
	Total N=	Passing N =	Average of all Students	Average of Passing Students
2013-14	6	6	36.5	36.5
2014-15	3	3	35.00	35.00
2015-16	8	6	34.75	43.83
2016-17	9	8	46.33	51.63
4-yr. totals	26	23	38.15	41.74

c. Graduate School Entrance Exams (Anecdotal Evidence)

Though included in the original Assessment Plan for 2016-17, we will no longer be evaluating the success of our program based on these data. The reason being, we have no way to obtain the scores for these exams (except MCAT) without the students' self-reporting. An indirect measure of our students' success on these exams will be assessed under Objective 7 below pertaining to students' acceptance into graduate programs.

2. Apply principles of biology, chemistry, physics and mathematics to the study and interpretation of human health and disease.

- a. Pathophysiology Final Exam:** a comprehensive final exam will be administered containing a subset of concept questions identical across all sections. These questions will be used for assessment of student learning. These questions are still in development. Due to small cohort size, we will collect data until a total of at least 25 students is reached. At that time we will establish a benchmark which aims for the following:

Benchmark: 80% of students will score 80% or above on these questions.

Results: These questions have not been assessed yet as they are still in development prior to approval and implementation.

b. Human Anatomy & Physiology Society Comprehensive Exam (HAPS):

The HAPS exam was administered to all students at the completion of the BIOS234 Anatomy and BIOS235 Physiology sequence.

Benchmark: Biomedical Sciences students' class average will be at or above the national mean (50% percentile).

*Data were both separated and combined for all Biomedical Sciences students having previously completed the HAPS exam including students from 2014-15, 2015-16, and 2016-17. **Benchmark met**; our average is 2.8 points above the national mean.*

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The ACS exam for General Chemistry was administered to all students at the completion of CHEM120 General Chemistry II.

Benchmark: Biomedical Sciences students' class average will be at or above the national mean (50% percentile).

*Results: Data were both separated and combined for all Biomedical Sciences students having previously completed the ACS exam including students from 2013-14, 2014-15, 2015-16, and 2016-17. **Benchmark not met.***

Biomedical Sciences Students' Class Average				
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4-yr. totals	26	23	38.15	41.74

d. Graduate School Entrance Exams (anecdotal evidence):

Though included in the original Assessment Plan for 2016-17, we will no longer be evaluating the success of our program based on these data. The reason being, we have no way to obtain the scores for these exams (except MCAT) without the students' self-reporting. An indirect measure of our students' success on these exams will be assessed under Objective 7 below.

3. Apply mechanisms of physiology and biochemistry to maintenance of body homeostasis.

a. ACS Biochemistry Exam:

The ACS exam for Biochemistry was administered to all students at the completion of BIOS302 Biochemistry, but did not provide an accurate measure of Biomedical Sciences students' success as the content of the exam did not accurately reflect concepts taught. *To remedy this, two separate institutionally-developed examination tools will be administered at the completion of BIOS302 Biochemistry and BIOS410 Molecular Biology, respectively, to encompass knowledge gained in these courses.*

Benchmark: 80% of students will score 80% or above on these questions.

b. HAPS Comprehensive Exam:

The HAPS exam was administered to all students at the completion of the BIOS234 Anatomy and BIOS235 Physiology sequence.

Benchmark: Biomedical Sciences students' class average will be at or above the national mean (50% percentile).

*Data were both separated and combined for all Biomedical Sciences students having previously completed the HAPS exam including students from 2014-15, 2015-16, and 2016-17. **Benchmark met**; our average is 2.8 points above the national mean.*

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2016-17	4	4	50.75	50.75	54.81 (n=1,309)
4-yr. totals	15	15	56.90	56.90	54.10

4. Pursue scientific inquiry through research experiences and interpretation of findings.

a. Unknowns Lab Report in Microbiology (2nd year students)

b. Final paper in Molecular Biology (3rd year students)

c. **Final paper/presentation in Field Experience & Capstone** (4th year students)

Rubrics will be developed to assess student learning in the areas of: ability to interpret laboratory findings and critical evaluation of the scientific literature. We would like to see growth in our students from 2nd to 4th year. Due to small cohort size, we will collect data until a total of at least 25 students is reached. At that time we will establish benchmarks which aim for the following:

Benchmarks:

75% of the students in Microbiology will achieve “Competent” level or above.

85% of students in Molecular Biology will achieve “Competent” level or above.

90% of students in Capstone will achieve “Accomplished” level or above.

Results: *Though the N was small for the students in Microbiology, they did meet the benchmark for their unknowns lab report. The initial groups of students completing their molecular biology and capstone papers included very small Ns. **Benchmarks were not met.***

Unknowns Report		Molecular Biology Paper		Capstone Paper	
Total N	% ≥ Competent	Total N	% ≥ Competent	Total N	% = Accomplished
12	75	12	66.67	9	33

5. **Explain genetic processes and environmental influences on health and disease.**

- a. **Genetics Paper:** students were assigned a final paper in which they explained the genetic basis of a chosen disease. A rubric assessed the students’ writing skills and understanding of genetic concepts learned throughout the semester and reflected in the paper. Due to small cohort size, we will collect data until a total of at least 25 students is reached. At that time we will establish a benchmark which aims for the following:

Benchmark: 80% of students will score 80% or above on this paper.

Results: *Though data does not include a full cohort size of 25 students, the benchmark was met for our initial group of six students.*

Genetics Final Paper		
	Total N=	Percent of students ≥ 80%
2016-17	6	100

- b. Pathophysiology Final Exam:** a comprehensive final exam will be administered containing a subset of concept questions identical across all sections. These questions will be used for assessment of student learning. These questions are still in development. Due to small cohort size, we will collect data until a total of at least 25 students is reached. At that time we will establish a benchmark which aims for the following:

Benchmark: 80% of students will score 80% or above on these questions.

Results: These questions have not been assessed yet as they are still in development prior to approval and implementation.

6. Utilize critical thinking to analyze and solve problems related to biomedical science.

a. Health Science Reasoning Test (HSRT).

In the original assessment plan, we proposed to develop a rubric to assess student learning in the area of critical thinking following writing and presentation of students' senior capstone projects. Instead, we will extract Biomedical Sciences student data from the HSRT exam which is administered following completion of BIOS330. Due to small cohort size, we will collect data until a total of at least 25 students is reached. At that time we will establish a benchmark which aims for the following:

Benchmark: Biomedical Sciences students' average will be at or above the national mean (50% percentile).

*Results: Though data does not include a full cohort size of 25 students, the **benchmark was met** for our initial group of three students.*

Biomedical Sciences Students' Class Average
HSRT Results

	Total N=	Average of all Students
2016-17	3	56

7. Demonstrate preparedness for pursuing graduate study or employment in biomedical sciences or related fields.

- a. Entrance exams:** *Though included in the original Assessment Plan for 2016-17, we will no longer be evaluating the success of our program based on data from graduate school entrance exams. The reason being, we have no way to obtain the scores for these exams (except MCAT) without the students' self-reporting. An indirect measure of our students' success on these exams will be assessed next.*
- b. Application to graduate programs:** These results indirectly demonstrate our students' success on graduate school entrance exams and the success of our program in preparing students for admission into a variety of graduate programs.

Benchmark: Of those who apply, 80% will be accepted to graduate school.

*Results: Nine students graduated from the Biomedical Sciences program during the 2016-17 academic year. Of these, 7 applied to graduate programs in a variety of areas with 6 being admitted. **Benchmark met: 89% were accepted.** The one student who was not accepted has retaken the MCAT and reapplied to MD programs.*

	Graduation Date	Program	Result	School
1	12/16	PA	Accepted	Union College
2	5/17	PA	Accepted	UNMC
3	5/17	PA	Accepted	UNMC
4	5/17	MD	Not Accepted	
5	5/17	MD	Accepted	St. George's University
6	5/17	PhD, Immunology, Pathology, & Infectious Disease	Accepted	UNMC
7	5/17	PhD, Biological Sciences	Accepted	UNL

- c. Employment Rate:** These results indirectly demonstrate our students' success and the success of our program in preparing students for employment in various biomedical science fields.

Benchmark: 50% will be employed in a biomedical science-related field within 12 months of graduation.

Results: Of the nine students who graduated from the Biomedical Sciences program during the 2016-17 academic year, 2 of these did not apply to graduate school and instead are employed in the field of Biomedical Sciences.

Benchmark met: 100% of those who sought employment were hired immediately following graduation.

	Graduation Date	Employer	Time to Employment
1	12/17	Biotest Plasma Center, Lincoln	Immediate
2	5/17	Nebraska Methodist, Omaha, Phlebotomist	Immediate

8. Develop basic biomedical research skills through basic science and/or clinical research related to human health and disease.

a. Field experience & Capstone: final paper/presentation

A rubric will be developed to assess student learning in the areas of experimental design and technical skill. Final papers/presentations will be assessed.

Benchmark: Due to small cohort size, we will collect data until a total of at least 25 students is reached. At that time we will establish a benchmark which aims for the following:

90% of students in Capstone will achieve “Accomplished” level or above.

Results: *Results: The initial group of seniors completing their capstone papers included a very small N. Benchmark not met.*

Capstone Paper		
	Total N=	% = Accomplished
2016-17	9	78

9. Consider philosophical, ethical, political, legal and social issues associated with research in the biomedical sciences.

a. Scientific Literacy: Science & Society Project

Students will complete an assignment relating science to controversial societal issues such as those listed in the above objective. Students will be required to evaluate the way that science is presented to society (non-scientists). A rubric will be developed to determine the students' understanding of the assigned topics from a scientific point of view. Due to small cohort size, we will collect data until a total of at least 25 students is reached. At that time we will establish a benchmark which aims for the following:

Benchmark: 80% of students will achieve 80% or above on this assignment.

Results: In upcoming semesters of Scientific Literacy, Biomedical Sciences students will be grouped together to complete this project. Last year, the groups were mixed between nursing and biomedical sciences students which would not be an accurate measure for our assessment report.

b. Field Experience & Capstone: final paper/presentation.

A rubric will be developed to assess student learning in the area of the intersection between science and society. Final papers/presentations will be assessed. Due to small cohort size, we will collect data until a total of at least 25 students is reached. At that time we will establish a benchmark which aims for the following:

Benchmark: 90% of students in Capstone will achieve "Accomplished" level or above.

*Results: The initial group of seniors completing their capstone papers included a very small N. **Benchmark not met.***

Capstone Paper		
	Total N=	Percent = Accomplished
2016-17	9	78

Retention Rate: Our fall-to-fall retention rate for all students will be 90%.

*Results: Our Fall 2016-Fall 2017 retention rate (including all students) was 75%. **Benchmark not met.** 4 students left Biomedical Sciences as follows:*

	Enrollment Date	Action	New Program	Reason
1	Fall 2015	Program Change at BCHS	Healthcare Studies	Biomedical Sciences did not fit her career goal
2	Fall 2015	LOA-did not return	No communication from student	LOA-Health-related
3	Fall 2016	Transfer	Animal Sciences Program	Was not interested in further studying human sciences
4	Fall 2016	Transfer	Biology	Program not a good fit

Graduation Rate: Our graduation rate will be 90%.

*Results: Our 2016-17 graduation rate was 90% **Benchmark met.** Of all students who entered the Biomedical Sciences program and were expected to complete their studies during the 2016-17 year, 9/10 students graduated. One student transferred due to health reasons, but earned an Associate's Degree via BCHS in May 2017.*

Exit Surveys: All nine objectives will be assessed via exit surveys upon graduation. Students will assess their own level of learning of Biomedical Sciences program objectives by rating themselves on a 4-point scale (4=Strongly Agree, 3=Agree, 2=Disagree, 1=Strongly Disagree). Alumni Surveys are mailed to graduates 12 months post-graduation. Due to small cohort size, we will collect data until a total of at least 25 students is reached. At that time we will establish a benchmark which aims for the following:

Benchmark: 80% of students will score themselves at 3 or above for each objective.

*Results: Though data does not include a full cohort size of 25 students, nonetheless the **benchmark was met** for our initial group of graduates.*

Biomedical Sciences Students'		
Exit Survey Results		
2016-17 graduates	Total N=	Percent of students scoring themselves at 3+
Obj #1	9	100
Obj #2	9	100
Obj #3	9	100
Obj #4	9	100
Obj #5	9	100
Obj #6	9	100
Obj #7	9	100
Obj #8	9	100
Obj #9	9	100

Alumni Surveys: All nine objectives will be assessed via alumni surveys mailed to alumni 12 months after graduation. Students will assess their own level of learning of Biomedical Sciences program objectives by rating themselves on a 4-point scale (4=Strongly Agree, 3=Agree, 2=Disagree, 1=Strongly Disagree). Due to small cohort size, we will collect data until a total of at least 25 students is reached. At that time we will establish a benchmark which aims for the following:

Benchmark: 80% of students will score themselves at 4 or above for each objective.

Results: Alumni surveys have not yet been distributed.

Determining Reasons for Gaps in Student Learning:

For those areas where the benchmark was not met, we had small Ns. Therefore, we will collect data until a total of at least 25 students is reached. At that time we will establish more firm benchmarks.

Adjustments to Narrow Gaps:

None at this time.

Planning and Budgeting Processes:

2017-2018 Budget approved by Executive Committee. No major adjustments were made.

Refining the Assessment Plan and Processes:

See the 2017-18 Assessment Plan for revisions.

Baccalaureate of Science in Biomedical Sciences

Assessment Matrix

METHOD OF ASSESSMENT	Objective #1: Demonstrate knowledge of a wide spectrum of principles underlying biomedical sciences.	Objective #2: Apply principles of biology, chemistry, physics and mathematics to the study and interpretation of human health and disease.	Objective #3: Apply mechanisms of physiology and biochemistry to maintenance of body homeostasis.	Objective #4: Pursue scientific inquiry through research experiences and interpretation of findings,	Objective #5: Explain genetic processes and environmental influences on health and disease.	Objective #6: Utilize critical thinking to analyze and solve problems related to biomedical science.	Objective #7: Demonstrate preparedness for pursuing graduate study or employment in biomedical sciences or related fields.	Objective #8: Develop basic biomedical research skills through basic science and/or clinical research related to human health and disease.	Objective #9: Consider philosophical, ethical, political, legal and social issues associated with research in the biomedical sciences.	Overall Program Effectiveness
Exit Survey	Benchmark met	Benchmark met	Benchmark met	Benchmark met	Benchmark met	Benchmark met	Benchmark met	Benchmark met	Benchmark met	Benchmark met
Alumni Survey	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HAPS Exam	Benchmark met	Benchmark met	Benchmark met							
ACS Exams	Not met	Not met	Not met							
Molecular Biology Lab Report				Not met						
Microbiology Unknowns Lab Report				Benchmark met						
Pathophysiology Final		ND			ND					
Genetics Disorder Paper & Presentation					Benchmark met					
Research Project/Capstone				Not met		NA		Not met	Not met	
HSRT Exam						Benchmark met				
Scientific Literacy Science & Society Assignment									ND	
College Entrance Exams: % Achieving	NA	NA					NA			NA

Benchmark Score										
Retention Rate										Not met
Graduation Rates										Benchmark met
Acceptance to Graduate Programs							Benchmark met			Benchmark met
Employment Rates							Benchmark met			Benchmark met