

Original article

Impact of a Summer Program in Healthcare on Career Decisions for High School and College Students – A Single Institution Experience

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Keywords: Pipeline program, summer program, healthcare partnership, healthcare career, mentoring

<https://doi.org/10.69735/001c.132400>

Introduction

Institutional summer programs exist to encourage young people interested in various professions, including healthcare, to immerse themselves in the topic for several weeks. However, program evaluation should be conducted periodically to evaluate whether or not the program is achieving its goal of furthering healthcare career development. Therefore, we surveyed our prior Summer Program in Healthcare attendees to assess their matriculation into a healthcare profession or educational track.

Methods

This was a retrospective study using data collected as part of normal assessment of programs conducted at a community hospital in Southfield, MI. We also surveyed students who attended the program to assess their career and educational choices by emailing a link to a 10-item Google Forms document twice between January and May 2023. We surveyed high school and college undergraduate students who attended the program from 2015 to 2019.

Results

A total of 115 learners were sent the survey; 45 responded (38% response rate). A large majority (73%) listed their career goal as healthcare. Respondents were either still completing their education (62%) or were working part- or full-time (38%); most (93%) had completed a four-year degree. At this point, 27% (n=12) had completed a post baccalaureate program (8 from graduate programs and 4 from medical school). Almost all students (96%) indicated the program provided them with experiences that helped them in their education or career and rated the program as excellent or good.

Conclusions

The program has been beneficial to high school and undergraduate students in informing their career. Moreover, the positive endorsement of items related to obtaining resources necessary for success provides evidence that our Summer Program in Healthcare achieved its goal.

INTRODUCTION

Summer camp courses offered by academic institutions to encourage young people to pursue specific professions are common and are used to enhance educational and career planning not only in medicine but also in science, technology, engineering, and math professions.¹⁻⁵ Since at least 1987, medical schools have been utilizing summer programs/camps to encourage young people to consider healthcare as a career.⁶

In 2001, our hospital began offering a summer program as an opportunity to enrich the education of high school and undergraduate college students and to prepare them for the journey into healthcare and research-related careers. The summer program has hosted between 25 and 35 participants each year over a two- to four-week period

and has educated more than 500 students over the last 20+ years. Even though the program began as a healthcare research-related course, during the last 10 years the program (Summer Program in Healthcare) has evolved into a daily system-based presentation by academic medicine faculty from a multitude of disciplines, lectures by second- and third-year medical students, cadaveric labs overseen by anatomists, simulated skills, some laboratory exercises, clinical experiences, and a group research project. In addition, the participants attended talks and workshops on the medical school application process, personal statements, and medical school interview tips. Even though the program has been in existence for over 20 years, previously only anecdotal outcomes have been recorded. Therefore, we evaluated the impact of the program on the students by as-

sessing their matriculation into a healthcare profession or educational track.

METHODS

This was a retrospective study using data collected as part of normal assessment of programs conducted at Henry Ford Providence Hospital (formerly Ascension Providence Hospital) during high school and college summer breaks. Institutional Review Board approval was obtained (IRB RMI20230235). The period from 2015 to 2019 was chosen for two reasons. First, the authors found that some of the contact information collected as a part of the application process prior to 2015 was incomplete, corresponding to a shift in program management. Second, the 2020 and 2021 courses were canceled due to the coronavirus disease 2019 pandemic, thus creating a natural break as well as preventing the introduction of potential confounders.

To assess their career and educational choices, we surveyed students who attended the program by emailing a link to a 10-item Google Forms document twice between January and May 2023. Program application information was used as a source of email addresses. However, some of the learners either did not respond to or had changed email addresses since their cohort's completion. It was discussed and determined that social media might be a pathway to contact previous participants where contact through email was returned. It was determined that LinkedIn® would serve as the primary source because the posted profiles skewed heavily toward academics and business. Following identification of persons on the site, an intra-site message containing a link to the anonymous survey was delivered first in June 2023. Follow-up messages were sent to those who did not respond in June of 2023. In situations where cohort members could not be identified, attempts were made to locate a profile on other platforms, i.e., Instagram®, Facebook®, etc., and the process was repeated.

Survey items collected data on employment/education status, career goals, and attendance and graduation data, but no identifying or demographic data were collected (Appendix A).

The curriculum was based on the anatomy lectures, didactic lectures by nursing, specialty physicians, residents, and medical students. Additional exposure to the laboratory and imaging were provided. Hands-on experience in the anatomy lab and simulation lab were provided. Additionally, the learners participated in a team-based learning activity in which the learners were assigned to groups, chose a topic, completed a literature review, then presented the topic to the group. Learners were expected to have enough knowledge beyond the presentation to be able to field rudimentary questions. Written feedback was provided by their fellow students and the program faculty. A schedule of the typical week is shown in [Appendix B](#).

Data were stored on a secure, firewall-protected, hospital Google Drive, and the data were only accessible by the authors. Descriptive statistics and frequencies were computed.

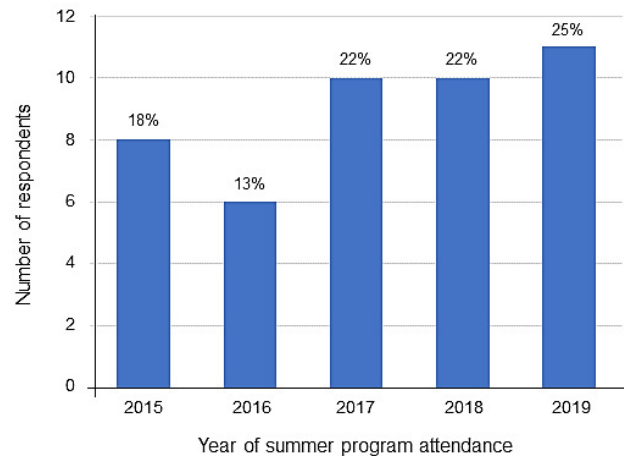


Figure 1. Number and percentage of respondents by year of attendance.

Because associated costs are an important factor related to the development and administration of programs such as these, available financial data were collected for each year, categorized, and descriptive statistics calculated. Physician and non-physician speakers volunteered their time. In-kind costs were computed for each group using \$120.00 per hour for physicians and \$50.00 per hour for non-physicians. Total financial costs were calculated by obtaining financial statements for three years and averaging the cost for every year, including supply costs and payments for lectures.

RESULTS

A total of 115 learners were sent the 10-item survey. Forty-nine surveys were returned, but 4 were incomplete, resulting in a response rate of 38% (45/115). Between 6 and 11 students from each year responded to the survey ([Figure 1](#)).

The purpose of the program was the encouragement of participants to seek careers in healthcare; therefore, three categories of data were collected from the students: 1) career goals, 2) educational attainment and employment status, and 3) the role the course played in their career and/or educational pathway. As might be expected, a large majority (73%) listed their career goal as healthcare. Other respondents' goals included science (6.7%), engineering (4.4%), and other (8.8%), which included pilot, healthcare consulting, journalism, and public service ([Table 1](#)).

When asked about their current educational and/or work status, over half of all respondents (n=28) indicated they were still completing their education as either full-time students or working while continuing to attend school ([Table 2](#)). The remainder indicated they were working part- or full-time (n=17). Within the ongoing education subset, 23 respondents indicated that they continued to be full-time students who were either working part-time or not at all. Almost all of the working respondents, n=16 (94%), were working full-time. Finally, 35 (78%) of the respondents endorsed that they were either working and/or student in a healthcare-related field; most of them were either

Table 1. Career goals of Summer Program in Healthcare students.

Career Goal	Frequency	Percent
Healthcare/Medicine	33	73.3%
Other	4	8.8%
Science	3	6.6%
Engineering	2	4.4%
Humanities	1	2.2%
Education	1	2.2%
Business	1	2.2%
Grand Total	45	100%

Table 2. Educational and employment status of respondents.

Employment Status	n
Student	28
Completing Medical School	15
Completing Medical School, Working Part Time: Healthcare	2
Completing Graduate School	4
Completing Graduate School, Working Full Time: Healthcare	2
Completing Graduate School, Completing Medical School	1
Completing Graduate School, Completing 4-year College, Working Full Time: Healthcare	1
Completing 4-year College, Working Part Time: Non-Healthcare	1
Completing 4-year College, Working Full Time: Healthcare	1
Completing 4-year College, Working Full Time: Non-Healthcare	1
Working	17
Working Full Time: Healthcare	9
Working Full Time: Non-Healthcare	4
Working Full Time: Non-Healthcare, Working Full Time: Healthcare	3
Working Part Time: Non-Healthcare, Working Part Time: Healthcare	1
Grand Total	45

currently completing medical school (n=17) or were working in healthcare (n=12, [Table 2](#)).

[Table 3](#) shows matriculation and educational attainment of the respondents. Most, n=42 (93%), affirmed that they had completed a four-year degree at the time of the survey. A total of 12 (27%) respondents stated they had completed a post baccalaureate program, 8 students (18%) from graduate programs, and 4 students (9%) from medical school. Additionally, 4 (9%) respondents endorsed participation in or completion of a fellowship or residency.

Table 3. Participant educational attainment at the time of survey administration.

Item	n	Percentage of n
Have you graduated from a 4-year college?		
Yes	42	93%
No	3	7%
Have you graduated from Graduate School-Not Medical School?		
Yes	8	18%
No	37	82%
Have you graduated from medical school?		
Yes	4	9%
No	41	91%
Have you completed or are you completing a post-graduate training program such as a physician residency or industry fellowship?		
Yes	4	9%
No	41	91%

Two survey questions were asked to gauge the perceived impact of the program. Impact was measured using a five-point rating scale ranging from “Definitely Yes” to “Definitely Not”. The questions were:

1. Did the Summer Program play a role in your career or education decision?
2. Looking back, did the Summer Program provide you with knowledge or experiences that helped you either in school or your career?

A total of 36 (84%) respondents stated that the program either “definitely” or “probably” played a role in their career or educational decision. Almost all respondents, n=43 (96%), reported that either “definitely” or “probably” the Summer Program provided them with experiences that helped them in their education or career ([Figure 2](#)).

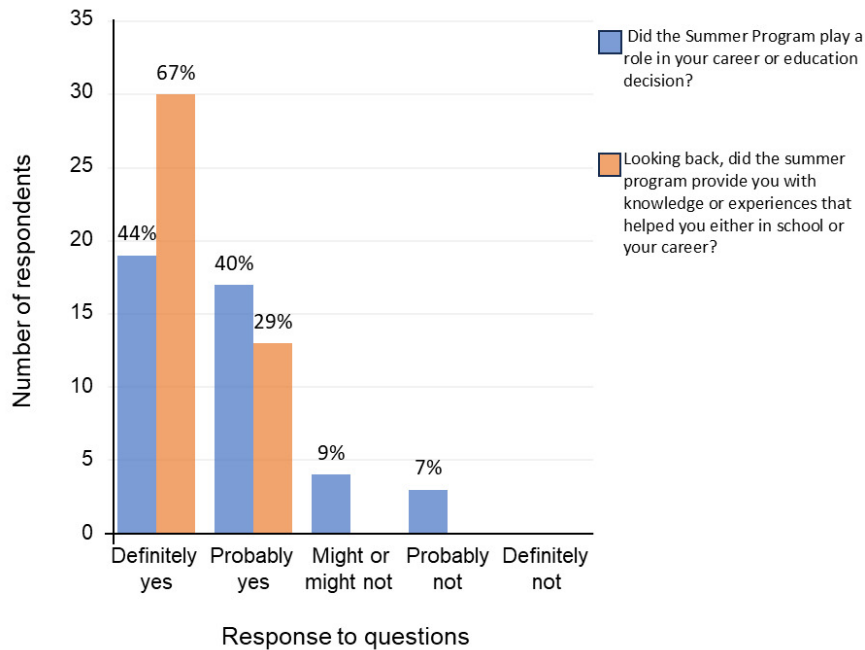


Figure 2. Self-reported career and educational outcomes.

Lastly, the learners were polled about learner satisfaction related to the program. Nearly all learners, $n=41$ (96%), rated the program as excellent or good on a five-point scale.

To determine the cost to run the program, we computed our expenses in various categories (Table 4). The non-personnel-related costs averaged about \$3700 per year. Most of the costs were for instructors and lecturers, as shown in Table 5. Each medical student instructor received a stipend of \$3500.00 per course; depending on the length of the course, either 2 or 3 instructors were needed, resulting in a mean cost of \$8167 per year. Practicing physicians and other persons delivering content were not paid, but the mean in-kind cost of physician instruction per year was \$1520, and the mean for non-physicians was \$217. Overall, the mean cost to run the program was \$13,976 per year. When the number of students and length of the program was taken into consideration, the average cost per student per day was \$30.51 (range \$27.24 - \$35.44).

DISCUSSION

The duration of healthcare-related summer programs cited in the literature varied from 1 to 30 days with different curricula (for example, introduction to the field, exposure to healthcare) with most courses ranging from 2 to 4 weeks.

The Summer Program in Healthcare is one of many pipeline programs held across the United States each year in different institutions. These programs are not specific to any one discipline, and they can be found in various areas of interest: biomedical sciences, medicine, pharmacy, and non-specific programming.^{1,7-14} Even though the areas of interest differed, there was significant cross-over in curricular activities. Most programs, including our program, provided opportunities for learners to meet and interact with

physicians and/or other members of the healthcare community and to obtain guidance on college and specialty school admissions. Two programs included information on financial literacy as well as the more typical topics associated with healthcare programs.^{1,15} Additionally, four programs provided experiences in the clinical environment through shadowing physicians and healthcare workers.^{8,12,13,15}

The data from the respondents showed that the Summer Program in Healthcare impacted the career and educational decisions of its participants. Most of the respondents have continued to post-secondary education and many have completed a four-year degree. Additionally, the respondents indicated that the program either provided resources that directly aided their decision regarding the field they chose or provided knowledge or skills that aided in their educational pathway. Because this was a program concentrating on healthcare-related materials, it was most interesting to note that of the 14 respondents that chose fields outside of healthcare, the program still influenced their decision. This could indicate that the program may have provided enough insight into healthcare to ensure that participants who were “on-the-fence” may have chosen alternative and possibly more personally appropriate pathways. While other programs investigated matriculation, our program broke matriculation down further by incorporating employment. While some of the respondents endorsed the traditional educational pathway from high school to college followed by medical/graduate school, many of the respondents indicated non-traditional pathways to education that included full-time employment.

There has been a wealth of evidence identifying pre-college factors related to college success.¹⁶⁻¹⁹ Similar to the Summer Program in Healthcare, all of the cited programs

Table 4. Summer program expenses not including personnel.

Category	Minimum	Maximum	Mean	Standard Deviation
Animal Tissue	\$13.05	\$25.97	\$17.66	\$7.21
Books	\$47.48	\$47.48	\$47.48	\$0.00
Cadaveric Tissue	\$1,198.00	\$1,759.00	\$1,423.50	\$195.50
Disposables	\$79.14	\$379.14	\$232.74	\$108.98
Durable Goods	\$126.25	\$753.80	\$412.06	\$317.49
Food	\$350.00	\$350.00	\$350.00	\$0.00
Lab Supplies	\$19.40	\$870.00	\$399.79	\$366.92
Other	\$23.07	\$25.07	\$24.40	\$1.16
Shipping	\$800.00	\$800.00	\$800.00	\$0.00
Total	\$2656.39	\$5010.46	\$3707.63	

Table 5. Mean personnel compensation per year.

Category	Minimum	Maximum	Mean	Standard Deviation	Compensation Type
Instructors	\$7,000.00	\$10,500.00	\$8166.67	\$2020.73	Stipend
Non-Physician Lecturers	\$100.00	\$300.00	\$216.67	\$104.08	In-Kind
Physician Lecturers	\$960.00	\$2040.00	\$1520.00	\$541.11	In-Kind
Total	\$8060.00	\$12840.00	\$9903.34		

used a combination of experiential learning, exposure to physicians and other healthcare providers, basic-skills education, and mentoring. As compared to other programs, our program stands out by including the development of a research project completed and presented to the group at course conclusion.

Program differentiation occurred with respect to content based on what we have defined as “preparation for success properties”.^{1,9,15,20,21} Preparation for success properties included topics such financial literacy, test taking, and academic preparation. Since its inception, preparation for success has been considered a key component of our curriculum. The reporting by 96% that the course influenced their career decision, and by 73.3% that they chose healthcare as a career shows that the program met its goal.

The overall cost of the program for the three years in which all financial data was available, \$41,928.75, was not insignificant to our department. However, the cost per student per day, \$31, was not exorbitant. By comparison, only one source cited, Fritz et al., documented cost at \$205.88 per student per day.⁹

The previous studies cited were prospective in nature. Learners were often selected based on their academic and socioeconomic standing. Stephenson-Hunter et al.,¹⁵ Fritz et al.,⁹ and Yeldora et al.²¹ selected high academically-achieving subjects representing underrepresented minorities. Winkleby et al.²⁰ went to lengths to discuss matching groups based on academic level, gender, and ethnicity, but did not specifically comment on representation except that learners were from a “low-income family,” although applications from underrepresented groups were given priority. In contrast, our program did not screen applicants’ grades

or socioeconomic factors prior to application and enrollment. However, it was assumed that many of its participants are academically prepared since applications were distributed through current healthcare workers within Henry Ford Providence Hospital.

The primary limitation of this study, due in large part to the low rate of return, was non-response bias. Attempts to identify students through social media were largely unsuccessful. Demographic data were not collected as a part of the survey, which may have allowed a comparison of the respondents to the non-respondents.

CONCLUSIONS

We found four studies with longitudinal outcome data; however, our study appears unique.^{1,9,15,20} By utilizing previous records and searching on social media, we were able to examine the progress of former students toward their career goals, not simply matriculating into a representative major. The evidence indicates that this program appears to have been successful in impacting its participants. Not only have these learners matriculated into healthcare and non-healthcare related fields based on their experience, but some of the previous learners are also now actively participating as active members of the healthcare community.

In conclusion, the data from the respondents showed that the Summer Program in Healthcare likely impacted its participants. Nearly all the responding graduates have matriculated into a college or university, and many continued into healthcare-related tracks. Moreover, the positive endorsement of items related to obtaining resources necessary for success provides evidence that the Summer Pro-

gram in Healthcare achieved its goal. The Summer Program has been beneficial to high-school and undergraduate students in educating them about their career options at an affordable and reasonable cost to the institution to overcome the shortages in all fields of healthcare.

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AUTHOR CONTRIBUTIONS

Conceptualization: Vijay Mittal (Lead), Jeffrey Flynn (Supporting). Methodology: Joseph Crutcher (Lead), Jeffrey Flynn and Vijay Mittal (Supporting). Validation: Joseph Crutcher (Lead), Jeffrey Flynn (Supporting). Formal Analysis: Joseph Crutcher (Lead), Jeffrey Flynn and Vijay Mittal (Supporting). Investigation: Hana Kallabat (Lead), Joseph Crutcher (Supporting). Resources: Joseph Crutcher (Lead). Data Curation: Joseph Crutcher (Lead). Writing-original draft: Joseph Crutcher (Lead). Writing-review and editing: Vijay Mittal (Lead), Jeffrey Flynn and Joseph Crutcher (Supporting). Visualization: Joseph Crutcher (Lead), Jeffrey Flynn (Supporting). Supervision: Vijay Mittal (Lead), Jeffrey Flynn (Supporting). Project Administration: Joseph Crutcher (Lead), Jeffrey Flynn (Supporting).

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FUNDING

The authors have no funding to report for this study.

DISCLOSURES

The authors have no disclosures or conflicts of interest to report for this study.

Submitted: October 29, 2024 EDT. Accepted: February 21, 2025 EDT. Published: March 16, 2025 EDT.



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APPENDIX A. PROGRAM ASSESSMENT-SUMMER PROGRAM IN HEALTHCARE

ASCENSION PROVIDENCE HOSPITAL SUMMER PROGRAM
IN HEALTHCARE POST-GRADUATE ASSESSMENT

Hello!

Thank you for participating in the Ascension Providence Hospital Summer Program in Healthcare Post-Graduate Assessment. As you may be aware, the Summer Program has been going for almost twenty years, and we wish to find out more about how the program affected the graduates. This short survey should take you less than two minutes to complete. Please answer the questions or complete the statements as honestly as possible. All identifying information including IP addresses will be removed prior to analysis of any data. Again, we appreciate your help in ensuring another group of individuals receives the best possible experience. If you have concerns about the project you may contact the Ascension Institutional Review Board at irb@ascension.org.

1. Completion Year: Which year did you complete the Summer Program in Healthcare?

- 2015
 - 2016
 - 2017
 - 2018
 - 2019
 - 2020
 - 2021
2. Employment Status: What is your current employment/education status? (Mark all that apply)
- Working Full Time: Non-Healthcare
 - Working Full Time: Healthcare
 - Completing 2-year College
 - Completing 4-year College
 - Working Part Time: Non-Healthcare
 - Working Part Time: Healthcare
 - Completing Vocational/Technical School
 - Active Duty Military
 - Completing Graduate School-not Medical School
 - Completing Medical School

3. College Graduation: Have you graduated from a 4-year College/University?

- No
- Yes

4. Grad School Graduation: Have you graduated from Graduate School-Not Medical School?

- No
- Yes

5. Med School Graduation: Have you graduated from Medical School?

- No
- Yes

6. Residency: Have you completed or are you completing a post-graduate training program such as a physician residency or industry fellowship?

- No
- Yes

7. Which category below best describes your career goal?

- Engineering
- Education (Teacher, Academic Administrator, Researcher)
- Healthcare/Medicine (Nursing, Medicine, Allied Healthcare)
- Business (Management, Accounting, Entrepreneurship)
- Arts (Painting, Sculpture, Theatre)
- Humanities (Philosophy, Language, Religious Studies)
- Science (Biology, Physics, Chemistry, Mathematics)
- Trades (Electrician, Plumber, Carpenter)
- Other _____

8. Summer Rating: How would you rate your experience in the Summer Program?

- Terrible
- Poor
- Average
- Good
- Excellent

9. Influence: Did the Summer Program play a role in your career or education decision?

- Definitely not
- Probably not
- Might or might not
- Probably yes
- Definitely yes

10. Knowledge: Looking back, did the summer program provide you with knowledge or experiences that helped you either in school or your career?

- Definitely not
- Probably not
- Might or might not
- Probably yes
- Definitely yes

Appendix B. Example of Weekly Schedule for Summer Program in Healthcare

Day of program	Time	Activity
1	10:00am – 11:30am	Orientation
	11:30am – 12:30pm	Lunch
	12:30pm – 1:00pm	Urinalysis Lab Introduction
	1:00pm – 2:00pm	Overview of Institutional Review Board (IRB) – IRB coordinator
2	8:00am – 9:00am	Pathology - Physician
	9:00am – 10:00am	Immunology – PhD Scientist
	10:00am – 10:30am	Laboratory Safety Procedures – Course instructor
	10:30am – 11:00am	Introduction to Anatomy/Cadaveric Dissections - Course instructor
	11:00am – 11:30am	Walk-Through of Anatomy Lab – Course instructor
	11:30am – 12:00pm	Lunch
	12:00pm – 12:30pm	Urinalysis Lab - Course instructor
	12:30pm – 1:30pm	Taking a Patient History - Course instructor
	1:30pm – 2:30pm	Medical Anatomy 1 - Course instructor
3	7:30am – 8:30am	Neurology - Physician
	8:30am – 9:00am	Information about Final Presentations - Course instructor
	9:00am – 10:00am	Pain Management – Nurse practitioner
	10:00am – 11:00am	Patient History Exercise - Course instructor
	11:00am – 11:30am	Patient History Exercise Review - Course instructor
	11:30am – 12:00pm	Lunch
	12:00pm – 1:00pm	Neurosurgery - Physician
	1:00pm – 2:00pm	Stem Cells in Medicine - PhD Scientist
	2:00pm – 3:00pm	Introduction to Research - Course instructor
4	8:00am – 9:00am	Interventional Cardiology - Physician
	9:00am – 10:00am	Introduction to Nutrition - Course instructor
	10:00am – 11:00am	Nutrition – Nutritionist
	11:00am – 11:30am	Lunch
	11:30am – 1:30pm	Anatomy Lab - Course instructor
	1:30pm – 2:30pm	Introduction to Biochemistry - Course instructor
	2:30pm – 2:45pm	Radial Immunodiffusion (RID) Assay & Epstein-Barr Virus Test Lab Introduction - Course instructor
5	8:00am – 9:00am	Psychiatry - Physician
	9:00am – 10:00am	Psychology – PhD psychologist
	10:00am – 12:00pm	Phlebotomy Lab - Phlebotomist
	12:00pm – 12:30pm	Lunch
	12:30pm – 1:00pm	Radial Immunodiffusion (RID) Assay & Epstein-Barr Virus Test Lab - Course instructor
	1:00pm – 2:00pm	Blood Bank Tour – Laboratory manager
	2:00pm – 3:00pm	Medical Anatomy 2 - Course instructor
	3:00pm – 3:30pm	Discuss Final Presentation Topics - Course instructor