

# Third-Year Medical College Rotations for Premedical Honors Program Undergraduates

HARVEY G. STENGER, JR., AND WILLIAM L. ZIEGLER  
BINGHAMTON UNIVERSITY—STATE UNIVERSITY OF NEW YORK

**Abstract:** Honors programs typically enroll many students interested in the healthcare field, and honors administrators and faculty do their best to ensure that those students' dreams are fulfilled. With Medical Doctor (MD) program acceptance rates averaging just 6.1%, students need a standout application. Experience has shown that getting accepted into a medical school is more than earning a great GPA and excelling on the MCAT exam; it also requires convincing a committee of professionals that an applicant has the right personal qualities and work ethic to succeed in the field of medicine, and applicants need to highlight their clinical experience as a method of standing out from the crowd. The authors describe an honors program internship for undergraduate students to participate in a unique experience that emulates the third-year curriculum of medical college, referred to as clinical rotations. The full-time, semester-long medical internship becomes an extraordinary and unusual asset on any student's medical school application. Of particular interest is that this program can be adopted by other higher education institutions for a relatively low cost to the college/university, contingent on a committed partnership with an appropriate medical facility.

**Keywords:** higher education honors programs and colleges; premedical; internship; educational innovations; high-impact practice; experiential education; medical school/college; Binghamton University – Scholars Program

**Citation:** *Honors in Practice*, 2024, Vol. 20: 241–262

## INTRODUCTION

Many students accepted to honors programs begin their academic journey with their sights set on medical school/college upon graduation. In this article, we highlight an honors program opportunity for undergraduate students to participate in a unique experience that emulates the third-year curriculum of medical college, referred to as clinical rotations. With exceptionally low medical school applicant acceptance rates as a backdrop, this program helps students create a standout application and provides an unparalleled high-impact medical experience for its undergraduate participants.

### Background

High-impact practices, typically in the context of experiential learning, have been a long-standing element of honors education. A strong focus on high-impact practices received renewed attention in 2008 when the Association of American Colleges and Universities (AAC&U) published “High-Impact Educational Practices: What They Are, Who Has Access to Them, and Why They Matter” (Kuh, 2008). Research on high-impact practices points to positive outcomes (Miller et al., 2018; Kilgo et al., 2015), and some studies recommend that students participate in multiple high-impact experiences (McNair & Albertine, 2012). Other studies suggest not just that these practices should be add-ons to a student’s academic learning but that they should be integrated into the curriculum (Chorazy & Klinedinst, 2019; Kuh, 2008). Recent research also shows that high-impact practices correlate with higher levels of academic challenge and student engagement as well as improved retention and graduation rates (Kuh & O’Donnel, 2013).

One of the typical high-impact practices is the internship experience. However, internships in and of themselves are not necessarily high impact. As summarized in the research conducted by O’Neill (2010, p. 5):

An internship is more likely to be “high impact” for students when it is intentionally organized as an activity that leads to particular learning outcomes; when students apply what they have learned in courses to work experiences, reflect on these experiences, and receive feedback that helps them to improve; when students build mentoring relationships with supervisors, faculty, and peers; when students are exposed to differences across people and in ways of thinking; and when students are asked to use their experiences to clarify their values,

interests, and personal goals—including, in this case, their values, interests, and goals related to careers.

For those in the field of honors education, a common observation is that many students enter honors programs with the intent of studying medicine. A premedical internship can help students decide if medicine is the right choice (Wang et al., 2015). Additionally, Lin et al. (2013) surmised that the premedical years need just as much attention as the actual years of medical school to help ensure the success of our students once they enter the profession. For those students who experience a basic premedical internship and determine that medicine is the right field for them, an addition of experiencing surgery (Vakayil et al., 2020) or internal medicine (Block et al., 2018) can be insightful and impactful. Additional research focused on premed internships shows benefits for women regarding gender-related challenges in the field of medicine (Rosenthal et al., 2013).

Another subject defined as a high-impact practice is the experience of conducting research. Studies suggest that active and collaborative learning and undergraduate research are of immense benefit to students (Kilgo et al., 2015). When research is part of an internship experience, the outcomes can be extraordinary, especially for premed students participating in a medically related internship (Vincent-Ruz et al., 2018). Additionally, with a reported worldwide shortage of doctors and the low representation of minorities in medicine, programs that expose the field of medicine to a diverse population are needed (Banuelos & Afghani, 2016).

Given the research regarding the positive outcomes of high-impact learning experiences and the demonstrated rewards to premedical undergraduate students who participate in internships, research, and exposure to medical practices, an outcomes-based premedical internship that includes a research component would result in a significantly beneficial learning experience for student participants.

## **Medical School/College Admissions and Application Considerations**

According to *U.S. News & World Report*,

Medical school acceptance rates range widely from about 20% at their highest to under 3% at the most selective institutions... The most selective medical school was Florida State University, with a 2.1% acceptance rate in fall 2020. On the other end of the spectrum, the University of

Arkansas for Medical Sciences reported the highest acceptance rate of 20.2% in fall 2020. Nationally, among the 121 ranked medical schools that provided this data to *U.S. News* in an annual survey, the average acceptance rate for 2020 was 6.5%. (Kerr, 2021)

*U.S. News & World Report* also states, “Medical school admissions committees typically consider an applicant’s GPA and MCAT scores, but experts say these metrics alone are not enough. Admissions officials also look at applicants’ life experiences, including their employment, volunteer work, clinical experience and research experience” (Kerr, 2021).

According to the *Princeton Review* (2024), “Getting accepted into a medical school is about more than earning a great GPA and beating the average MCAT scores. It also requires convincing a committee of professionals that [the applicant has] the personal qualities and “work ethic [to succeed] in medicine.” The *Princeton Review* suggests that applicants “highlight [their] clinical experience” as a method of “stand[ing] out from the crowd,” noting that “the majority of successful applicants have some experience in a hospital, clinic, hospice, or other healthcare setting.” With clinical experience, applicants “will be able to speak far more effectively about why [they] want to become a physician and...will know what the practice (rather than just the study) of medicine is actually like.” The *Princeton Review* further states that “for a more in-depth experience,” students should “set up a preceptorship with a willing physician. In a preceptorship, motivated pre-meds shadow a doctor as they go about their day. They “have the opportunity to observe the physician’s activities, often in a number of different healthcare environments: office, hospital, community, and occasional field trips to conventions. When it comes to clinical shadowing, diversity of experiences over quantity is most important. So, 100 hours shadowing doctors in different specialties is stronger than 500 hours with an orthopedist.”

### **The Third Year of Medical School**

According to the American Medical Association (2015), the third year of medical school is when students turn their classroom knowledge into a real-world experience. Students can expect large “shifts in [their] day-to-day experiences as they learn” and experience firsthand “how to communicate with patients, partner with care teams, and navigate the idiosyncrasies of a hospital.” Clinical rotations are “typically set in a core group of specialties:

pediatrics, surgery, internal medicine, family medicine, obstetrics-gynecology, and psychiatry.”

## **HONORS PROGRAM PREMEDICAL INTERNSHIP**

Undergraduates enrolled in the Binghamton University Scholars Program (2023), the university-wide honors program at Binghamton University—State University of New York, are eligible to participate (pending an application and acceptance) in a premedical internship called the Guthrie Scholars Premedical Internship Program, which emulates significant aspects of the third-year curriculum or medical rotations of a typical medical college MD/DO (Medical Doctor/Doctor of Osteopathic Medicine) curriculum. Guthrie is a healthcare organization serving the Southern Tier of New York and the Northern Tier of Pennsylvania. It runs the Guthrie Medical Group, four hospitals (including Robert Packer Hospital, a medical college teaching hospital), 20 clinics, and several other assets that are crucial to the delivery of healthcare to the region (Guthrie-RPH, 2024).

The internship, known as Guthrie Scholars, is a 12-credit-hour, semester-long, full-time, unpaid experience for Binghamton University Scholars Program students wishing to attend medical school upon graduation. The internship takes place in residence at the Guthrie Clinic and Robert Packer Hospital campus (about 40 miles west of Binghamton University), located in Sayre, PA. The facility is a 254-bed teaching hospital with a Level II Trauma Center; it includes a new intensive care unit, a clinical skills lab, and a full range of other diagnostic, medical, and surgical services. Interns complete a research project, participate in observations in a wide variety of specialties, undergo skills lab training, and more (Guthrie-Scholars, 2024). They complete weekly reflection papers and a time log, conduct a bench or clinical research project, and attend lectures. They also participate in medical terminology training, an observership in trauma, an experience on Guthrie’s helicopter air-ambulance, skills lab training, clinical observations, medical/surgical grand rounds, resident and student lectures, and teaching rounds. Interns shadow and interact with a variety of healthcare professionals, including physicians, nurses, social workers, nutritionists, allied healthcare providers, and administrators across the Guthrie organization. Students also spend time with Guthrie Hospice, Guthrie Home Healthcare, and the Greater Valley Ambulance Service. Interns spend an average of 48 hours per week toward all requirements of the internship for 15 weeks.

## Clinical Observation

While completing their semester on the Guthrie campus, the Scholars complete clinical observations as well as a Clinical Research Project. Some of the areas in which the Scholars may observe include the following:

- Operating Room Orientation
- Internal Medicine
- Nephrology
- Endocrinology
- Hematology/Oncology
- Gastroenterology
- Radiology (Ultrasound, MRI, Nuclear Medicine)
- Radiation Oncology
- General Surgery
- Orthopedics
- Occupational Medicine
- Bariatric Weight-loss Center
- Family Medicine
- Cardiology
- Emergency Medicine
- Greater Valley Ambulance Service
- Physical and Occupational Therapy
- Respiratory Therapy
- Ob/Gyn-Clinic
- Behavioral Science Unit
- Medical Grand Rounds
- Surgical Grand Rounds
- Teaching Rounds
- Nursing
- Social workers
- Nutritionists
- Allied healthcare providers and administrators
- Guthrie Hospice
- Guthrie Home Health Care
- Guthrie Air Flight Tea

## Skills Lab

The Skills Lab provides an appropriate setting outside the operating room for residents, students, and physicians to gain proficiency with, or brush up on, a variety of techniques. The Lab hosts lectures, laboratory sessions, and scheduled training. Features include the following:

- Five dedicated rooms: three training rooms equipped and staged appropriately for the skill being practiced; one lecture space; and an office.
- Equipment, such as the Stryker endoscopic video system, anesthesia machine, Valley Lab cautery machine, and other technologies decommissioned by the hospital.

- Expired items such as central line kits and sterile supplies that are utilized during training.

## **Research and Professional Recognition**

Soon after the semester begins, Scholars meet with designated Guthrie staff for a discussion regarding medical research. Students are provided a choice of participating in an ongoing research project or one of their own, contingent on Guthrie's securing a physician for supervision of the student's research. As members of a formal teaching hospital, many of Guthrie's physicians are involved in medical research and encourage student participation. Students meet regularly with the supervising physician and complete an Institution Research Board (IRB) application and Research Protocol document with guidance from the physician and the Guthrie research staff. At the conclusion of the semester, Scholars are required to submit a fully executed research paper and provide a 20-minute presentation on their research topic to the staff of both Guthrie and the Binghamton University Scholars Program. Recent research topics have included "The Clinical and Financial Impact of an Evidenced-Based Adhesive Small Bowel Obstruction Management Protocol," "Implication of ACE Gene Polymorphisms on Pacemaker Effectiveness," and "Squamous Cell Carcinoma of the Rectum, an Epidemiological Assessment." Several students have had their work published in medical journals and/or have presented their research findings at national conferences.

## **Medical Terminology Training**

Each Scholar is required to study a medical terminology journal and to pass an examination relative to appropriate terminology. Upon passing the examination, the student is awarded a certificate of completion.

## **Guthrie Air**

Guthrie Air, a critical-care helicopter program based at Robert Packer Hospital, provides quality emergency medical care and transports critically ill and injured patients in accordance with the regulations of the Pennsylvania and New York Department of Health. Guthrie Scholars are provided the opportunity to observe Guthrie Air during the internship; the experience typically includes flying as an observer on the air ambulance.

## **Housing, Meals, Course Materials, and Cost**

The Guthrie organization picks up all costs for this program, including related Guthrie staffing as well as housing and meals on the Guthrie campus for the students. For students and Binghamton University in general, no additional costs are associated with the Guthrie Scholars Premedical Internship other than regular tuition and fees typically paid for a full-time student at Binghamton University. All supplementary learning materials are provided or readily available from no-cost online resources. The university's honors program executive director oversees the internship and acts as the instructor of record as a responsibility of the directorship. For the student, this educational opportunity is considered a credit-bearing unpaid internship, and no stipend or salary is provided.

Full details regarding housing, meals, course materials, and costs can be found in Appendix A.

## **Academic Credit**

The experience is a full-time internship that fulfills 12 credit hours. The course designations of these credits and how they apply to each degree program vary by major. Thus far, participants have included those with majors in biochemistry, biology, biomedical engineering, chemistry, computer science, integrative neuroscience, mathematics, and physics. For each of these majors, the students are able to map credits from the internship into their program requirements. As students from other majors are accepted to the Guthrie internship, assessments are made on an as-needed basis to determine credit mapping to those programs as well.

Additionally, due to the robust learning, the depth and breadth of knowledge gained, and the professional experience obtained, the Guthrie Internship satisfies the honors program's experiential and capstone requirements.

## **Taking Binghamton University Courses while at Guthrie**

Several Guthrie Scholars have found it possible to take a Binghamton University course concurrently while participating in the Guthrie Scholar Internship, which is critically important in some majors to ensure that student participants can complete their degree requirements on time. The timing must be such that the Binghamton course does not interfere with assignments at Guthrie.

## Application Process

Students apply for the internship with an online application. Minimum requirements include a demonstrated interest in attending medical school, enrollment in and good standing within the university honors program, a minimum 3.25 overall GPA, completion of two and preferably three required honors courses by the time of the internship, evidence of engagement in the university honors program, two letters of recommendation, and preferred junior standing.

Subsequent to the application submission, applicants are interviewed at the university by the honors program executive director and senior associate director and interviewed at Guthrie by the program director.

Enrollment is capped at four students per semester and averages about two students per semester. Surprisingly, with over 400 students enrolled in the honors program and the stellar reputation of the internship, applications to this internship do not typically exceed the capacity of the internship. Enrollment caps at Guthrie are determined based on the number of medical college residents in rotations at Guthrie as well as the number of students enrolled from another participating institution.

Full details of applying to the program can be found in Appendix B.

## Supervision

### *University Supervision*

Students are expected to complete a multitude of assignments. The honors executive director is the instructor of record and responsible for all aspects of the program directly related to the university, including providing a final letter grade. The following assignments are overseen and assessed by the honors director (assignment details are provided later):

- Weekly reflections
- Time log
- Photo assignments
- Research report
- Research final presentation
- Analysis of Guthrie evaluations of student

The honors director visits student interns on-site at the Guthrie campus twice per semester: once for a midterm review and again when students give their final research project presentations. Ongoing and regular communication with the Guthrie program director is conducted regarding all aspects of student participation, performance, and assessment.

### *Medical Facility Supervision*

The Guthrie Scholars Premedical Internship program director from the Department of Medical Education is responsible for providing direction, assignments, and execution of all aspects of the program related to the hospital/medical setting. Both the hospital and the university are in constant contact, working closely to ensure that students receive the best possible experience and that, in turn, the hospital and university participation is worthwhile to the medical facility and the university. The Guthrie program director has responsibility for overseeing the following as they relate to student participation (note that many of these areas are also overseen by additional Guthrie staff and the university honors director; in many cases, student work undergoes multiple layers of oversight):

- Professionalism of the student
- All Clinical Observations scheduling
- Grand Rotation scheduling
- Research Project oversight
- Research Project Presentation oversight
- Medical Terminology Course
- Skills Lab scheduling
- Guthrie Air scheduling
- Verification of reflections completion
- Verification of document of effort
- IRB—all aspects
- Research Protocol document completion
- Research Report completion
- Research Presentation completion
- Final Assessment of student performance (very detailed)
- All other Guthrie assignments

### *Feedback/Assessment*

Feedback/assessment is provided to the student by the Guthrie program director and the honors director. Students meet with the Guthrie Scholars program director on a regular basis for feedback, scheduling, problem resolution, and research progress. The research component of the program is overseen by the supervising physician and appropriate Guthrie staff. A written evaluation of the following topics (assignment details are provided to each student) is prepared by the Guthrie program director and provided to the student and the university honors director at mid term and at the conclusion of the internship:

- Attendance and punctuality
- Quality of work
- Attitude
- Judgment, reliability, adaptability
- Human relations
- Communication skills
- Time management
- Learning ability
- Professionalism
- Overall performance

Additionally, comments are suggested for each of the following:

- Preparedness for the Internship
- Strengths and weaknesses
- Recommendations for improvement

A recognition luncheon accompanies the research presentations, and the Scholars are presented with a certificate of completion for their participation in the program.

## **STUDENT RESPONSIBILITIES, ASSIGNMENTS, REQUIREMENTS, AND EXPECTATIONS**

Internship activities are planned for at least four days a week with many opportunities for increased clinical observation time. Students are expected to commit an average of 48 hours per week for 15 weeks during either the fall or spring academic semester, which includes time during observations, skills lab training, research, attending rounds, shadowing, clinicals, classroom instruction, studying, and more. Students are required to dress and act professionally at all times.

The Guthrie Program director provides a day-by-day schedule to students that must be adhered to without exception. Students must ask permission in advance (other than sudden illness, which needs to be communicated to Guthrie) from the Guthrie program director to miss any days or times when attendance would normally be expected.

All written work must be submitted to both the university honors director and the Guthrie program director. At the end of each week, students must write a reflection paper regarding their experiences during the week. Students are required to document how their time was spent each day to ensure that an average of 48 hours per week is committed to the internship. Reflections must document the time spent, what was observed, and the student's thoughts on what was observed. As a reflective strategy, students are required to submit a JPG photo at the end of the first full month, the end of

the second full month, and near the conclusion of the internship, showing an interesting portion of the internship experience. A description of the research project to be undertaken is documented in the Institutional Review Board (IRB) Application and is a requirement for all research projects. An additional research-related document, the Research Protocol Document (RPD), is also required. The RPD details the way that the student research project will be conducted. The IRB and the RPD are prepared with the assistance of Guthrie staff and must be completed and approved prior to commencing research.

An outline, rough draft, and formal final report detailing each Scholar's research project and the conclusions drawn from the project are due during the internship. A formal presentation (preceded by a rough draft) detailing the research project and the conclusions drawn from the project is required. Guthrie and the university provide guidance regarding the preparation of the presentation.

In the ten-plus years of existence, no participants in this program have dropped or been dropped for any reason. However, if such a situation should occur, then the students must follow all university guidelines for course withdrawals.

Full details of the student's responsibilities, assignments, requirements, and expectations can be found in Appendix C.

## **APPLICABILITY TO OTHER HIGHER EDUCATION INSTITUTIONS**

There are very few barriers to adopting this program or a worthwhile subset of the program at other institutions, assuming that a willing medical facility partner is available. The single greatest barrier is putting a hospital administrator in place to create schedules applicable to students and the hospital staff. In the information that follows, the costs of each feature of the program have been divided into zero-to-low-cost features, moderate-cost features, and high-cost features. Not all features are necessary for those wishing to adopt a similar program but lack the monetary or personnel resources to do everything this particular program offers.

### **Zero-to-Low-Cost Features**

#### *Clinical Observations*

Having a hospital scheduling administrator already in place will ease the financial burden of creating student schedules. Most hospitals will already have this sort of administrator in place.

### *Research/Recognition*

The medical profession requires that those holding licenses in varying fields must spend time each year in professional development to stay current. Having a student assist with research studies can be a big plus, and recognition via professional publications is sometimes more attainable with student assistance.

### *Medical Terminology Course*

If the course is currently offered in person or if an online version is available, then the cost to add a student or two each semester for this offering is minimal. Most hospitals will already have an online or in-person course available.

### *Guthrie Air*

Guthrie's air ambulance flies only when emergencies are present. Students participate by occupying a vacant seat in the helicopter on actual calls, so no additional cost is necessary. This is an extraordinary service offered by Guthrie, but the lack of such a service would not be a detriment to the internship.

### *Academic Credit*

There is no additional cost for the academic credit the students receive over and above whatever the current full-time enrollment rate is for the participating students.

## **Moderate-Cost Features**

### *Skills Lab*

An instructor/supervisor is necessary, of course, but skills labs are already in place in medical facilities for students and professionals alike. New students simply enroll in scheduled openings. Other skills lab costs might include research supplies and other materials that might equal that of a traditional college biology or chemistry lab. It would not be unreasonable for students to be required to pay a lab fee as in many university laboratory courses.

### *Study Materials*

If the cost of study materials seems out of reach for the sponsoring medical facility or the college/university, then it would not be unreasonable to ask

students to bear these costs just as they would be required to purchase study materials such as textbooks, software, or other items for any credit-bearing course.

## **High-Cost Features**

### *Housing*

The Guthrie Campus is about a 45-minute drive from the university campus, which may or may not be considered a long commute. However, weather along the New York—Pennsylvania border can create very difficult driving conditions for that sort of commute. Students are welcome to live in housing available on the Guthrie Campus at no cost to the student. Experience has shown that most students maintain both the Guthrie Campus housing and their university or off-campus housing near the university during the time of their premedical internship. If the medical facility is not in commuting proximity to the student's academic home, then the savings from giving up on-campus or near-campus housing can be used to offset the cost of housing near the medical facility.

### *Meals*

Guthrie provides students with food vouchers during their internship, but just as the students would need to purchase food while attending college, we can assume that they would be prepared to purchase food while participating in the internship. Guthrie's provision of food vouchers is a testament to the value that Guthrie places on this program, but it is certainly not an option that must be imitated.

## **Benefits Even with Reduced Features**

Note that a program of this nature is of tremendous benefit, certainly to the student participants but also to the medical facility and the university. The benefits of the program will still be substantial even if some of the features listed as high-cost or moderate-cost must be reduced or eliminated due to financial constraints.

## SUMMARY

The Guthrie Scholars Premedical Internship is a unique experience for undergraduate honors students intending to apply to and attend medical school/college. With MD program acceptance rates averaging just 6.1%, students need a standout application, and certainly an experience emulating a third-year medical school rotation is an extraordinary and unusual asset on any student's application. This program has been in existence for nearly a decade, having 36 student participants. Ninety-four percent (34) have continued their education in the healthcare field or have gone directly into healthcare-related professions. The majority of students, 74% (27), have continued their education in MD/DO programs, 19% (7) have continued into the healthcare field (not MD/DO programs), and 6% (2) have gone into non-healthcare-related endeavors.

The graduation and honors completion rate of student participants is 100%, and the feedback from student participants has been exceptional. One student has written, "We were exposed to a new medical field almost every day and were able to help deliver babies, observe a multitude of surgeries, and learn how to speak with patients." Another has said, "I am now in my third year of medical school on clinical rotations and am still realizing the benefit I gained from the Guthrie Scholars Program. I have felt well prepared going into my clerkships since I already had prior experience from Guthrie." Further comments include the following: "I learned that medicine is about going beyond the surface to piece together a puzzle not only of a certain pathology but of a full human being with complex life circumstances and excruciating individuality" and "Now, as a third-year medical student... I'm forever grateful for the eye-opening experience that I had at such an early stage of my future career as a Guthrie Scholar" (Guthrie-Scholars, 2024).

## REFERENCES

- American Medical Association. (2015, September 1). Your checklist for success in your third year of med school. [ama-assn.org/medical-students/medical-school-life/your-checklist-success-your-third-year-med-school](https://www.ama-assn.org/medical-students/medical-school-life/your-checklist-success-your-third-year-med-school)
- Banuelos, A., & Afghani, B. (2016). An innovative programme for premedical students. *The Clinical Teacher*, 13(5), 357–362. [doi.org/10.1111/tct.12450](https://doi.org/10.1111/tct.12450)
- Binghamton University Scholars Program. (2023). [binghamton.edu/programs/scholars](https://binghamton.edu/programs/scholars)

- Block, L., Wang, K., Gao, C. C., Wu, A. W., & Feldman, L. S. (2018). There's a lot more to being a physician: Insights from an intensive clinical shadowing experience in internal medicine. *Teaching and Learning in Medicine*, 30(3), 266–273. [doi.org/10.1080/10401334.2017.1415148](https://doi.org/10.1080/10401334.2017.1415148)
- Chorazy, M. L., & Klinedinst, K. S. (2019). Learn by doing: A model for incorporating high-impact experiential learning into an undergraduate public health curriculum. *Frontiers in Public Health*, 7, 31. [doi.org/10.3389/fpubh.2019.00031](https://doi.org/10.3389/fpubh.2019.00031)
- Guthrie-RPH. (2024). Guthrie Robert Packer Hospital. [guthrie.org/location/robert-packer-hospital](https://guthrie.org/location/robert-packer-hospital)
- Guthrie-Scholars. (2024). Guthrie Scholars Program. [guthrie.org/healthcare-professionals/students/guthrie-scholars-program](https://guthrie.org/healthcare-professionals/students/guthrie-scholars-program)
- Kerr, E. (2021, April 13). 10 med schools with the lowest acceptance rates. *U.S. News & World Report*. [aol.com/news/10-medical-schools-lowest-acceptance-13000406.html](https://aol.com/news/10-medical-schools-lowest-acceptance-13000406.html)
- Kilgo, C. A., Ezell Sheets, J. K., & Pascarella, E. T. (2015). The link between high-impact practices and student learning: Some longitudinal evidence. *Higher Education*, 69, 509–525. [doi.org/10.1007/s10734-014-9788-z](https://doi.org/10.1007/s10734-014-9788-z)
- Kuh, G. D. (2008). Excerpt from “High-impact educational practices: What they are, who has access to them, and why they matter.” [qubeshub.org/community/groups/jan2020/File:/uploads/High-Impact\\_Educational\\_Practices\\_What\\_They\\_Are\\_Who\\_Has\\_Access\\_to\\_Them\\_and\\_Why\\_They\\_Matter.pdf](https://qubeshub.org/community/groups/jan2020/File:/uploads/High-Impact_Educational_Practices_What_They_Are_Who_Has_Access_to_Them_and_Why_They_Matter.pdf)
- Kuh, G. D., & O'Donnell, K. (2013). *Ensuring quality and taking high-impact practices to scale*. American Association of Colleges and Universities. [aacu.org/publication/ensuring-quality-and-taking-high-impact-practices-to-scale](https://aacu.org/publication/ensuring-quality-and-taking-high-impact-practices-to-scale)
- Lin, K. Y., Parnami, S., Fuhrel-Forbis, A., Anspach, R. R., Crawford, B., & De Vries, R. G. (2013). The undergraduate premedical experience in the United States: A critical review. *International journal of medical education*, 4, 26–37. [doi.org/10.5116/ijme.5103.a8d3](https://doi.org/10.5116/ijme.5103.a8d3)
- McNair, T. B., & Albertine, S. (2012). Seeking high-quality, high-impact learning: The imperative of faculty development and curricular intentionality. *Peer Review*, 14(3), 4–5. [dgm81phhvh63.cloudfront.net/content/user-photos/Publications/Archives/Peer-Review/PR\\_SU12\\_Vol14No3.pdf](https://dgm81phhvh63.cloudfront.net/content/user-photos/Publications/Archives/Peer-Review/PR_SU12_Vol14No3.pdf)
- Miller, A. L., Rocconi, L. M., & Dumford, A. D. (2018). Focus on the finish line: Does high-impact practice participation influence career plans and early job attainment? *Higher Education*, 75, 489–506. [doi.org/10.1007/s10734-017-0151-z](https://doi.org/10.1007/s10734-017-0151-z)
- O'Neill, N. (2010). Internships as a high-impact practice: Some reflections on quality. *Peer Review*, 12(4), 4–8. [dgm81phhvh63.cloudfront.net/content/user-photos/Publications/Archives/Peer-Review/PR\\_FA10\\_Vol12No4.pdf](https://dgm81phhvh63.cloudfront.net/content/user-photos/Publications/Archives/Peer-Review/PR_FA10_Vol12No4.pdf)

- Princeton Review*. (2024). Craft a stand-out medical school application. [princetonreview.com/med-school-advice/make-your-medical-school-application-stand-out](https://www.princetonreview.com/med-school-advice/make-your-medical-school-application-stand-out)
- Rosenthal, L., Levy, S. R., London, B., Lobel, M., & Bazile, C. (2013). In pursuit of the MD: The impact of role models, identity compatibility, and belonging among undergraduate women. *Sex roles*, 68(7–8), 464–473. [doi.org/10.1007/s11199-012-0257-9](https://doi.org/10.1007/s11199-012-0257-9)
- Vakayil, V., Chandrashekar, M., Hedberg, J., Bauman, B. D., Malik, S., Yerxa, D., Hendrickson, L. G., Kernahan, P., Hadley, M. E., & Harmon, J. V. (2020). An undergraduate surgery interest group: Introducing premedical students to the practice of surgery. *Advances in Medical Education and Practice*, 11, 339–349. [doi.org/10.2147/AMEP.S245234](https://doi.org/10.2147/AMEP.S245234)
- Vincent-Ruz, P., Grabowski, J., & Schunn, C. D. (2018). The impact of early participation in undergraduate research experiences on multiple measures of premed path success. *Scholarship and Practice of Undergraduate Research*, 1(3), 13–18. [lrdc.pitt.edu/schunn/papers/Spr18SPUR\\_Vincent-Ruz.pdf](https://lrdc.pitt.edu/schunn/papers/Spr18SPUR_Vincent-Ruz.pdf)
- Wang, J. Y., Lin, H., Lewis, P. Y., Fetterman, D. M., & Gesundheit, N. (2015). Is a career in medicine the right choice? The impact of a physician shadowing program on undergraduate premedical students. *Academic Medicine*, 90(5), 629–633. [doi.org/10.1097/acm.0000000000000615](https://doi.org/10.1097/acm.0000000000000615)
- 

The authors may be contacted at [ziegler@binghamton.edu](mailto:ziegler@binghamton.edu).

## APPENDIX A

### HOUSING, MEALS, COURSE MATERIALS, AND COST

#### **Costs**

The Guthrie organization picks up all costs for this program. For students and Binghamton University in general, there are no additional costs associated with the Guthrie Scholars Premedical Internship other than regular tuition and fees typically paid for a full-time student at Binghamton University (in-state, out-of-state, and international rates apply). This educational opportunity is considered a credit-bearing unpaid internship, and no stipend or salary is provided.

The university honors program executive director oversees the internship and acts as the instructor of record as a responsibility of the directorship. In that regard, this program is not considered a direct expense to the university.

#### **Course Materials**

No formal course materials are required for interns. All necessary information is provided in person or readily available from no-cost online resources.

#### **Housing**

Housing for participating students is of no cost for students and is located at the Guthrie—Robert Packer Hospital campus in a college-style double room (2 beds) equipped with a kitchenette and private bath. Students may keep their university housing (all costs apply) or live at Guthrie all week long for the entire semester.

#### **Meals**

Meals, at no cost to students, are provided at Guthrie-Robert Packer Hospital via a voucher system.

#### **Fitness Center**

Students have 24/7 free access to Guthrie's fitness center, referred to as Club Guthrie

## APPENDIX B

### APPLYING TO THE PROGRAM

#### Application Process

Students apply for the internship with an online application. Each applicant must meet the following criteria to be considered:

- A sincere and demonstrated interest in attending medical school upon graduation from Binghamton University.
- Enrolled in and in good standing within the Scholars Program (honors).
- Minimum 3.25 overall GPA.
- Completion of two and preferably three required honors courses by the time of the internship.
- Evidence of engagement in the Binghamton University Scholars Program as documented in the student's co-curricular transcript and any additional evidence.
- Two letters of recommendation from university faculty or appropriate staff.
- Junior standing, which is ideal given the timing of applications to medical school; however, sophomores through seniors are encouraged to apply.

Subsequent to the application submission, applicants are interviewed at the university by the honors program executive director and senior associate director and interviewed at Guthrie by the program director.

#### Number of Participants

Enrollment is capped at four students per semester and averages about two students per semester. Enrollment caps at Guthrie are determined based on the number of medical college residents in rotations at Guthrie as well as the number of students enrolled from another participating institution.

## APPENDIX C

### STUDENT RESPONSIBILITIES, ASSIGNMENTS, REQUIREMENTS, AND EXPECTATIONS

#### Time Commitment

Internship activities are planned for at least four days a week (typically Monday–Thursday) with many opportunities for increased clinical observation time. Students are expected to commit an average of 48 hours per week for 15 weeks during either the fall or spring academic semester, which includes time during observations, skills lab training, research, attending rounds, shadowing, clinicals, classroom instruction, studying, and more. A weekly activity log documenting all activities and time committed is required.

#### Dress and Professionalism

Students are required to dress and act professionally at all times.

#### Scheduling and Time Off

The Guthrie Program director provides a day-by-day schedule to students which must be adhered to without exception. There are no days off for hospitals, and everything runs 24x7x365. University holidays are not automatically an internship/hospital holiday, and the hospital is not on an academic calendar. Spring break is non-existent at a hospital. Students can skip classes at a university, but there is no such thing as skipping things while at Guthrie. An illness can prevent a student from attending class but needs acknowledgment at Guthrie. None of these scenarios means students cannot observe religious obligations or take time off for holidays, breaks, or other obligations; it does mean that students must ask permission in advance (other than sudden illness, which needs to be communicated to Guthrie) from the Guthrie program director to miss any days or times when attendance would normally be expected.

#### Written Work

All written work required to be submitted to Guthrie must also be submitted to the university honors director weekly. If these assignments are to be evaluated by Guthrie personnel, then the graded version must also be submitted to the university; this is to include all written work applicable to the following:

- All Clinical Observations
- Grand Rotations
- Research Project
- Research Project Presentation
- Medical Terminology Course
- Skills Lab
- Guthrie Air
- All other Guthrie assignments

#### Reflections

At the end of each week, students must write a reflection paper on their experiences during the week. Students must document all activities that correspond to the Document of Effort (see next section). Student reflections should document not only time spent but also reactions to what is seen and learned. Comments must be included regarding what students find exciting and/or career related as well as what is found unappealing. Commentary (rather than just the facts) should be about 50% of what is written in each reflection. The name and title must be provided of every Guthrie employee with whom an intern interacts.

**Documentation of Effort**

Students are required to document how their time was spent each day to ensure an average of 48 hours per week is committed to the internship. Hours are to be documented in clock time and clock hours in daily, weekly, and total formats in the following categories:

- Classroom hours
- Observation hours
- Skills Lab
- Medical Terminology course
- Other courses
- Research
- Studying and reading hours
- Writing Reflections
- Preparing/Writing Research Paper
- Preparing Research Presentation
- Other hours (should be explicit)

**Institutional Review Board (IRB) Application (Guthrie Document)**

This document is a description of the research project to be undertaken and is a requirement for all research projects. The IRB application is a Guthrie document prepared with the assistance of Guthrie staff, and it is due prior to commencing research.

**Research Protocol Document (RPD)**

This document is a requirement that details the manner in which the student research project will be conducted. The RPD is a Guthrie document prepared with the assistance of Guthrie staff, and it is to be submitted with the IRB Application.

**Photo Assignments**

As a reflective strategy, students are required to submit a JPG photo at the end of the first full month, the end of the second full month, and near the conclusion of the internship, showing an interesting portion of the internship experience. Action photos are preferred (i.e., in a lab, Guthrie Air, or other activity).

**Research Report (Written)**

An outline, rough draft, and formal final report detailing each Scholar's research project and the conclusions drawn from the project are due during the internship. The Research Report is both a Guthrie and a Binghamton University assignment. Content requirements can be found in the Research Presentation information. All formatting requirements (provided in detail) must be followed.

**Research Presentation (Presented at Guthrie)**

A formal presentation (preceded by a rough draft) using PowerPoint, detailing the research project and the conclusions drawn from the project, is required. Guthrie and the university provide guidance regarding the preparation of the presentation. Heavy use of visuals and minimal use of text are requirements for the presentation.

Presentations should be approximately 20 minutes in length and must include the following topics (additional topics are acceptable with permission from Guthrie):

- Introduction
- Terminology
- Background
- Objectives/Purpose
- Methodology
- Data
- Results
- Limitations
- Significance of Results, including why the topic is important
- Future Research Potential/Work
- References

**Dropping (or Dropped from) the Internship**

Students must follow all university guidelines for course withdrawals. If a student is not participating at an expected level, the student is encouraged to drop the course and discontinue the program. It should be noted that in its 10-plus years of existence, no participants in this program have dropped or been dropped for any reason.