

Academic Business Plan for the MS and PhD Program in Pharmaceutical Sciences, School of Pharmacy and Pharmaceutical Sciences, Binghamton University.

Overview *that provides a brief description of the program or facility being proposed. Emphasis should be on the capability that will be gained. After reading this section, the reader should have no question about just what is being proposed.*

The School of Pharmacy and Pharmaceutical Sciences (SOPPS) is a free-standing research-focused Pharmacy School in Binghamton University – SUNY. The School was established in 2015 and enrolled the first class in the PharmD program in 2017. After Fall 2020, the full 4 year program will be enrolled, and we anticipate an average of approximately 360 PharmD students across all years. Nationally, Pharmacy Schools with PhD programs are more renowned than Schools without such a program. **The mission of the new SOPPS is to develop a strong graduate research program in the field of pharmaceutical sciences by adding Master’s and PhD programs in addition to our innovative, ongoing PharmD program.** Binghamton University is an R1 institution and is one of the four main research campuses of the State University of New York (SUNY) system (Stony Brook, Buffalo, and Albany). We expect that addition of PhD and MS programs to SOPPS would bring Binghamton University’s ranking to 2nd in NY State and within the top 10 Schools of Pharmacy nationally. The focus of this academic business plan is to develop strong MS and PhD programs in Pharmaceutical Sciences that will be offered in the Binghamton University's Health Sciences Campus at the newly constructed SOPPS building in Johnson City, NY.

The proposed MS and PhD programs will graduate the next generation of pharmaceutical/pharmacist scientists to be well-versed in emerging areas of drug target discovery, drug efficacy, safety, formulation, and delivery. The overall goal is to prepare highly competent scientific leaders to conduct innovative and impactful research in the fields of pharmaceutical sciences in industry, academic, private or federal agencies.

Context *analysis that examines the current situation of the academic unit and suggests how the proposed development can utilize existing resources and structures to good advantage. In general, it will be more feasible and cost effective to build on existing strengths rather than undertake development in an entirely new direction.*

The proposed MS and PhD programs in Pharmaceutical Sciences will be housed in the \$60M newly constructed, dedicated 4-floor SOPPS building that opened in fall 2018. The 105,521 sq. ft. SOPPS building includes two floors of educational space, and two floors of research space. Research wet laboratories on the 3rd and 4th floors are flexible and open design (12,400 sq. ft. per floor). Wet labs use a modular/flexible system with ceiling mounts of electricity, computing/IT, and gases. These laboratories are existing structural, financial and human resources within the School.

SOPPS currently has 12 tenured or tenure-track faculty within the Department of Pharmaceutical Sciences (PhD), 1.7 dedicated permanent laboratory staff and one full-time administrative coordinator. Two additional tenure-track faculty lines are also already assigned to the Department to be hired on funding lines established for the PharmD program. Committed

extramural research funding to SOPPS is \$2.3 M in its 3rd year of operation, including two projects in a NIH U54 pediatric pharmacology center. The grant portfolio of our faculty members is significantly increasing. At the beginning of 2020, Pharmaceutical Sciences faculty members received 3 new NIH awards (2 R15 awards and 1 K99/R00 award) and two new grants from private foundations. The proposed MS and PhD programs will take advantage of these pre-existing structural, financial, and human resources within the School, and will leverage the existing and well-established classrooms and research facilities that are equipped with state-of-the-art instruments that will also support the proposed graduate research programs. These are interdisciplinary MS and PhD programs with strong research and resource capabilities, where students can learn from different laboratories and faculty members without boundaries. Students will also leverage expertise of other faculty across different departments within the School and across campus. The School currently employs 14 clinical practice faculty and 3 additional faculty from the Heath Outcomes & Administrative Sciences department. Faculty from all 3 departments participate in ongoing collaborative research projects (e.g., Lyme disease research, health outcome measures, and bioinformatics) within the School.

It is pertinent to note that MS and PhD programs can be initiated without requiring any new infrastructure. The Graduate program director, faculty members of the Pharmaceutical Sciences department, the 1.7 departmental laboratory staff as well as the Administrative Assistant for Pharmaceutical Sciences are **fully paid** by the School and are committed to contribute to instructional efforts and administrative oversight of the proposed program. The proposed program will also take advantage of the existing faculty members and the two new tenure-track faculty lines that are **already allocated to SOPPS** in the business plan to deliver the PharmD program. That is, **no funding for faculty lines (two to-be-hired or existing) is requested to deliver the proposed MS and PhD programs.**

***Benefits** statement that details what the sponsoring unit and the University will gain from the establishment of the program or facility. It is essential that a clear connection be drawn between the new development and the existing mission and goals of the unit and that the associated improvements in program be examined. It should also be made clear how the program or facility relates to the mission and the strategic plan of the University. Since this is an academic plan, it will be necessary to address separately the aspects of education, research, and service.*

More broadly, Binghamton University's mission combines academic excellence and public service. The university's strategic plan, "the Road Map," notes that "Binghamton University is a premier public university dedicated to enriching the lives of people in the state, region, nation, and world through discovery and education and to be enriched by partnerships in those communities." In order to accomplish this goal, the university has laid out the plan of becoming "a nationally recognized university for outstanding graduate education" by increasing the "transformational impact of the university's research, scholarship, creative activities and graduate education on society." The "transformational impact" of academic scholarship can be clearly seen in the healthcare field, as both education and research provide a widely recognized and tangible societal benefit. Thus, Binghamton University's recent addition of School of Pharmacy and Pharmaceutical Sciences (SOPPS) and, specifically, the NYS Department of Education registration of the Doctor of Pharmacy (PharmD) program, is a significant step towards accomplishing these goals.

The proposed MS and PhD programs in Pharmaceutical Sciences will add another level of research excellence to the School, the university and the region, and advance our mission in both academic excellence and public services. As one of the SUNY- system university centers, Binghamton has been a leader in graduate education since 1965, with a distinguished record in health professional fields, engineering, and management as well as in the arts and sciences. The addition of MS and PhD programs in Pharmaceutical Sciences will expand our research and practice in the field of biomedical and pharmaceutical sciences. By training students to gain expertise in the development, rigor, and technique of the pharmaceutical sciences, the new programs will benefit the community both in the generation of novel discoveries by our students and future alumni to better human health, and by contributing highly skilled individuals to further research and entrepreneurship of the biopharmaceutical industry in the State.

We expect to attract and retain high quality undergraduate students from different department across Binghamton University campus as we are already achieving this goal with our ongoing PharmD program (about 20% of the students enrolled in our PharmD program are from Binghamton University). More specifically, the MS and PhD programs will attract BU undergraduate students from Biology, Biochemistry, Chemistry and Biomedical Engineering departments and provide them with career enhancement opportunities. We expect that the proposed MS and PhD programs in pharmaceutical sciences will strengthen the overall graduate program at Binghamton University and will provide a pathway for placement of students in the field of pharmaceutical sciences.

Finally, Binghamton University's President Stenger recently articulated a vision of expanding graduate enrollments through the development of innovative new programs that anticipate or respond to emerging societal challenges and student demand. A key focus of the proposed MS and PhD programs in Pharmaceutical Sciences is innovation in drug development, including molecular targeting and novel formulations, educating and graduating talented scientist in the field, and advancing research to tackle incurable diseases.

Education: The MS and PhD programs in Pharmaceutical Sciences are designed to deliver an integrated curriculum in the field of biomedical and pharmaceutical sciences. Faculty members mainly from the Department of Pharmaceutical Sciences will run the program, including curriculum delivery and assessment. Upon completion of the didactic and practical courses, the program will prepare its graduates to emerge as highly skilled and competent scientists who will become successful research assistants, laboratory managers or independent research investigators working in specialized areas in academia, industry or federal agencies. It is important to emphasize that the MS program is unique and is designed to deliver class and lab work in analytical methods and instrumentation in order to prepare students for the workforce. MS students have the option of completing a research project in the Department or through internships to expand their experience, or to enhance their learning through didactic course electives. The entire program is designed to be completed in 1.5 years. The PhD program is designed to be completed in 4 to 5 years. Each student is expected to take five basic courses and will also take advantage of advanced electives in the fields of genomics and proteomics, bioassays development, drug design and drug delivery to specialize in the research area selected by the student. Both didactic and practical courses will be taught by existing faculty and pre-

existing 'to-be-hired' faculty lines assigned to the Department of Pharmaceutical Sciences. Statistical course will be delivered by an existing faculty from the Department of Health Outcome & Administrative Sciences.

Research: Faculty members who will be running the MS and PhD program in Pharmaceutical Sciences are engaged in research activities spanning from basic to clinical and translational research. More specifically, we have 3 faculty working in cancer therapeutic target development and drug testing, 4 faculty working in muscular dystrophy pre-clinical and clinical studies including biomarker development, two faculty working in drug design and drug delivery, and one faculty working in development of bioinformatics for biomarker studies. Faculty members from the School of Pharmacy have developed strong collaborations with other departments across campus and regionally. Several faculty are active members of recently established tick-borne illness center in collaboration with the Department of Anthropology at Binghamton University and Cornell University College of Veterinary Medicine. Grant awards to date have totaled in excess of \$4.2 million, demonstrating that we have excellent resources to support high-quality MS and PhD programs.

Services: The proposed programs are expected to provide both academic and community services. Several of our faculty are already serving on a number of committees across campus, including IACUC, UPC, Faculty Senate, Graduate Committee, and Transdisciplinary Areas of Excellence. It is also important to emphasize that SOPPS research core facilities, especially the mass spectrometry facility, are not only serving faculty members within the Department of Pharmaceutical Sciences, but also investigators from other Departments across campus (e.g. Biomedical Engineering, Biology and Anthropology departments), investigators in New York State and beyond. In terms of community services, faculty members from our Department have established partnerships with private companies and universities regionally and nationally to combat skin cancer, tick borne diseases and other infectious diseases. Today we have established one of the largest sites to recruit patients for biomarker studies in Lyme disease and muscular dystrophies. We also anticipate working with local hospitals and health care centers to strengthen research areas that are impactful in public health and awareness.

Cost statement that outlines the capital cost of establishing the program or facility. This should also provide as much detail as possible concerning the source of the capital or one-time funds that will be required. When appropriate, there should also be an analysis of intangible costs such as lost opportunities and political liabilities created. Also included should be an outline of human resource costs. What type and level of personnel are envisioned as being involved with the program?

The State of New York provided \$60 million to establish the School of Pharmacy and Pharmaceutical Sciences in Johnson City (Binghamton University Health Sciences Campus). This new state-of-the-art, 105,000 sq. ft. building has two floors of fully equipped and high-quality classrooms for education and two floors devoted to cutting edge, contemporary and multidisciplinary research. Although the proposed MS and PhD programs in Pharmaceutical Sciences will be a new offering by the School, all the infrastructure, and major financial and human resources (Departmental faculty, SOPPS part-time librarian, Departmental lab technicians, Departmental administrator) are already in place for the PharmD program and will

support the new MS and PhD programs. No additional expenses will be required for the teaching and mentoring efforts of the SOPPS faculty. As noted above, faculty listed as “to be hired” (two tenure-track faculty, TBH1 and TBH2) in this application will be hired on faculty lines that are already approved and allocated to the Department for the existing PharmD program. The only additional expenditures needed are to cover the cost of small equipment, supplies and consumables for the delivery of the MS program; salary of a graduate administrative assistant; and salary of one teaching assistant to assist existing faculty to run the program. The budget to cover these costs will be obtained from the tuition resources of the new MS program. 1) The Graduate Administrative Assistant will be responsible for coordinating student recruitment activities and processes (applications, interviewing, advertising, travel, applicant inquiries); developing/processing/recording activities for current students, including program registration, stipends, school and institutional program assessment and reporting requirements, and travel; developing and maintaining alumni surveys and records; and assisting faculty with program and student questions. Based on other graduate administrative assistants in programs at the university, we anticipate this position to be at the UUP SL-1 level. 2) The Teaching Assistant is needed to support the teaching mission of the program. Specifically, laboratory courses in the MS program are a key component of the mission to provide highly skilled graduates for the biotechnology industry in the State. The TA will assist faculty in the operation and delivery of these laboratory courses.

One-time funds to start the program are listed at \$18,000. These funds will cover small equipment to run the MS lab courses (e.g. SDS and DNA gel apparatus, power supplies, mass spectrometry columns, etc.). Recurring expenses (not human resources) of the program include program recruitment advertising and travel, reagents and consumables, annual software licenses (eg. ChemDraw, Adobe, FlowJo), and equipment maintenance/chargebacks.

These costs for establishing and operating the programs will be funded from the generated revenues from the Master’s program tuition (see detailed revenues and costs in the Table provided in the section labeled Financial Plan below).

Operating Plan *that specifies not only what will be done but who will do it and when it may be expected to be done. The period of the plan will depend upon the program or facility being developed but it would generally span at least the first five years of existence.*

The Graduate Program Director with the established committee for the MS and PhD graduate programs in Pharmaceutical Sciences and the Graduate Administrative Assistant will be responsible for development, operation and assessment of the overall program. The table below depicts the tasks and responsibilities with tracked milestones along with responsible parties.

Date	Tasks and milestones	Responsible parties
Spring 2019	Draft the full MS/PhD program proposal including syllabi (Completed)	Graduate director and Faculty Committee
Summer 2019	Submit full proposal to Graduate School and suggest external examiners to evaluate the program (Completed)	Graduate director, Dean and Assistant Dean of the Graduate School.
Fall 2019	External examiner site visit (Completed)	Graduate School, SOPPS Dean, Department Chair, Graduate Director and all faculty members.
Before the end of	Respond to external examiners (Completed)	Graduate director and faculty

2019		members
Spring 2020	Internal review of the proposal (Completed)	Graduate School, curriculum committee, graduate council, EPPC faculty senate.
Before the end of Spring 2020	Submit the internally reviewed proposal to SUNY and NYS Department of Education (Pending).	Dean of the Graduate School
Upon SUNY's approval	Advertise the MS and PhD programs in Pharmaceutical Sciences (initiated)	SOPPS Assistant Dean for Enrollment Management and Student Affairs. Graduate Administrative Assistant, Graduate School Admissions, Graduate director
Year-1 and ongoing	Review applications for admission and enrollment each year moving forward	Admission subcommittee from the Department of Pharmaceutical Sciences and the graduate director
Fall-Year-1 and ongoing	Teach foundation courses for the MS and PhDs program and oversee lab rotations for the PhD program	Faculty members from the Department of Pharmaceutical Sciences
Spring Year-1 and ongoing	Teach foundation courses for the MS and PhD programs and oversee lab rotations for PhD students.	Faculty members from the Department of Pharmaceutical Sciences
Year-1 and ongoing	Program Assessment and Improvement	Graduate director, faculty committee, SOPPS assessment committee
Fall Year-2 and ongoing	Research project or industry internship placements for the MS program. Teach electives for the PhD program. Establish dissertation research committees for the PhD program.	Graduate director, Faculty members from the Department of Pharmaceutical Sciences, Administrative Assistant
Spring Year-2 and ongoing	Master's graduation Teach electives for the PhD program	Graduate director, Faculty members from the Department of Pharmaceutical Sciences,
Year-3 and ongoing	Research dissertation progress for the PhD program	Graduate director and faculty subcommittees.
Year-4 and ongoing	Research dissertation progress or PhD candidate status for the PhD program	Department Chair, faculty subcommittees and Graduate director
Year-5 and ongoing	Graduate placement monitoring	Graduate director, faculty members, BU Alumni Association

Recruitment plan: Upon SUNY approval of the program, SOPPS Assistant Dean for Enrollment Management and Student Affairs, the Graduate Administrative Assistant and the Graduate director will work closely with the Admission team of the Graduate School to advertise the new program regionally, nationally and internationally. Enrollment of students from historically underrepresented groups will be encouraged by a recruitment program designed to produce a diverse and well-qualified applicant pool. We will also make efforts to recruit students by attending and actively participating in conferences for minority students such as Annual

Biomedical Research Conference for Minority Students. Admissions representatives will build relationships with the BU undergraduate population, which has a high percentage of minority students (see diversity table in the full proposal). We will advertise widely to include all socioeconomic levels and as we grow, we will seek and utilize tuition assistance (scholarships where possible) to attract a diverse group of applicants.

Admission requirements:

- All students applying to graduate programs are to submit their application materials through the graduate school, including an application form, transcripts, GRE scores, TOEFL scores (as applicable), two letters of recommendation, and a personal statement.
- Students must hold a bachelor's degree before they may enter the MS or PhD graduate program
- Bachelor's degree must have been earned from a nationally or regionally accredited college or university
- 12 or more credits in higher-level chemistry, biochemistry, biology, physiology, pharmacology, or related areas. All students need to have basic introductory coursework in chemistry.
- Students are expected to have a cumulative GPA of 3.0 or above, with a science GPA being 3.0 or above.
- Cumulative verbal and quantitative GRE scores are desired and expected to be above 300, and international students must submit TOEFL scores above 100 to be considered for admissions.
- Exceptions will be considered on a case-by-case basis; students will be advised to contact the graduate director for advice.
- The Pharmaceutical Sciences admission committee composed of 5 faculty including a chair will conduct on-site interviews for pre-selected national and regional MS and PhD applicants, and remote interviews for international applicants.

Staffing plan: *(here we have to clearly explain how to increase diversity among to be hired faculty but at the same time explain that that no additional cost is needed).*

Over the past 4 years, the Department of Pharmaceutical Sciences has hired a total of 10 faculty with PhD degrees or PhD and PharmD degrees. The Department is one of three in the school, complementing and coordinating research activities with the Department of Pharmacy Practice and the Department of Health Outcome & Administrative Sciences. The Department of Pharmaceutical Sciences will oversee and run the MS and PhD programs. The Department's faculty consist of 10 full time faculty (4 tenured and 6 tenure-track), one part-time tenured faculty, one part-time tenure-track faculty, and one full-time lecturer. Two additional tenure-track faculty will be hired by the School to join the Department of Pharmaceutical Sciences by 2021. *It is important to emphasize that the budget to hire these faculty has been already allotted to School for the PharmD program as whole and approved by the President and the Provost.* For this reason, no new faculty lines are required for the MS and PhD programs. Therefore, no faculty lines are listed as expenses under the financial plan below. No additional cost or expenditure is required to hire the remaining faculty Departmental faculty (TBH1, TBH2). Three

existing faculty from the Department of Health Outcome & Administrative Sciences will also assist in administering the proposed programs and will provide expertise in the field of bioinformatics and biostatistics. As existing faculty members are experts with areas of specialization appropriate to cover all areas of research and educational skills needed for the MS and PhD programs, we are well-positioned to start the program immediately upon receiving SUNY approval. In addition to its existing faculty members, the Department of Pharmaceutical Sciences has one full-time and one half-time dedicated laboratory technicians who will assist with practical courses. One full time IT staff member is already well-integrated in and supported by the School. He assists lab personnel and faculty with computer, internet; institutional software, database and data storage capabilities; and will provide these services at no additional cost to MS and PhD program operations. Furthermore, one librarian is dedicated to the School on a part-time basis for the PharmD program. She will also support the MS and PhD programs within her current effort at the School. **The only personnel resources as expenditures to the new program are one graduate administrative assistant and one teaching assistant will be hired to assist with the programs.**

Faculty members of the Department of Pharmaceutical Sciences are diverse, representing four continents (North America, Europe, Africa and Asia). Two of our new faculty members are underrepresented minorities (African American and Hispanic). The Department of Pharmaceutical Sciences was recently awarded a Presidential Diversity Fellowship at Binghamton University to recruit a native Nigerian, who currently contributes to Departmental teaching and research. About half of our faculty members are women. Recruiting more qualified women and minority faculty is essential for continued growth and creativity in our academic setting. For the future faculty hires both within the School and the Department, we will continue to encourage applications from women and underrepresented minorities. We have created a hiring pipeline to ensure equal opportunity employment, compensation, and other terms and conditions of employment without discrimination on the basis of age, race, color, religion, disability, national origin, gender identity or expression, sexual orientation, or marital status.

To improve tenure, promotion and retention our School has mandated that each faculty member will have a mentoring team. This team is assembled immediately after recruitment and provides guidance to the faculty members on teaching, research and service areas annually. Each faculty member submits a report to their respective mentoring team and receives written, constructive feedback annually. Faculty mentoring teams and their reports are coordinated by the Associate Dean for Research in our School.

Financial Plan *that is keyed to the Operating Plan. This should include an analysis of the ongoing cost of operation and identify the sources of the funds that will be required. Obviously, the plan must show a surplus or break-even bottom line but it may include a subsidy from the sponsoring unit.*

The proposed MS and PhD programs in Pharmaceutical Sciences are expected to produce a net gain for Binghamton University. The overall program will be supported through the already existing and ongoing SOPPS institutional infrastructure, financial and human resources including full- and part-time paid faculty, 1.7 laboratory technical staff and one Administrative Assistant.

Additional support for the PhD program will come from external funding and future training grants.

New net revenue and expenses presented in the Table below are specifically for the MS Program. These include a budget to support a Teaching Assistant, a Graduate Administrative Assistant, a budget to support laboratory courses (large equipment use and maintenance, small equipment purchases [year 1], reagents and consumables), and program advertising and recruitment. Please see a more detailed description above in “Costs”.

Enrollment and revenue for the MS program					
	Year 1	Year 2	Year 3	Year 4	Year 5
Full-time	10	20 (2 nd year students Fall semester only)	20 (2 nd year students Fall semester only)	20 (2 nd year students Fall semester only)	20 (2 nd year students Fall semester only)
Revenue	\$131,940	\$197,910	\$197,910	\$197,910	\$197,910
Program expenses					
Library	0	0	0	0	0
Laboratories	0	0	0	0	0
Capital Expenses	0	0	0	0	0
Equipment (small)	\$18,000	\$1,500	\$1,500	\$1,500	\$1,500
Supplies: Laboratory consumables, reagents, and software	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000
Others (specify) - Maintenance of core equipment	\$5,000	\$8,500	\$8,500	\$8,500	\$8,500
Program recruitment (advertising, travel)	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000
One TA line	\$20,000 (0.5 TA line for year 1)	\$40,000	\$40,000	\$40,000	\$40,000
SL1- Administrative assistant	\$37,000	\$38,110	\$39,253	\$40,430	\$41,643
Total expenses	\$103,000	\$111,110	\$112,253	\$113,430	\$114,643
Net gain/loss	\$28,940	\$86,800	\$85,657	\$84,480	\$83,267

Design that provides as much detail as possible about the program or facility.

The MS and PhD programs in Pharmaceutical Sciences are designed to educate and train students in the use, development, and implementation of emerging technologies to advance research in the fields of pharmaceutical and biomedical sciences. More specifically, the program will educate the next generation of scientists to be well-versed in emerging areas of drug target discovery, drug testing and drug delivery, and will prepare graduates for careers in a variety of scientific fields and healthcare leadership positions. The MS program is focused on foundational and technical knowledge to prepare students with work force-ready skills and the PhD program will prepare students to become competent scientists to conduct innovative and impactful rigorous research in the fields of pharmaceutical and biomedical sciences in industry, academic, private or federal agencies.

The PhD curriculum will require a minimum of 67 credits with the following breakdown:

- Core classes (credits; year to be taken): Cellular and Molecular Basis of Human Disease (4; year 1); Biostatistics (3; year 1); Pharmaceutical Sciences I and II (4 each; year 1); Lab rotations (3 each; year 1); Student seminar (1 per semester; all years); Critical Thinking and Communication (4; year 2); Research/Dissertation design (varied; year 2-completion).
- An additional required 9 credits will be tailored to the needs and research areas of each doctoral student through three electives (3 credits each) to be taken in the second year. Options for this class include, but are not limited to, doctoral level chemistry, biomedical engineering, pharmaceutical sciences, or pharmacy classes.
- The remainder credits are for research dissertation and participation in seminars.

The MS curriculum will require a minimum of 33 credits with the following breakdown:

- Core classes (credits; year to be taken): Cellular and Molecular Basis of Human Disease (4; year 1); Biostatistics (3; year 1); Pharmaceutical sciences I and II (4 each; year 1); Analytical Methods and Instrumentation I and II (3 each; year 1); Student seminar (1 per semester; all years). Note, a student may petition the departmental graduate committee to accept PHRM 698 Lab rotations (up to 6 credits), in place of the Analytical Methods and Instrumentation I and II coursework requirement.
- The remainder of the credits required (~9) will be tailored to the needs and goals of each master's student through either a research project/industry rotation and one elective, or from 9 credit hours of electives. Electives must be taken from 500+ level options from biology, chemistry, biomedical engineering, pharmaceutical sciences, or pharmacy classes. Note, PHRM 699 Mentored Research (up to 6 credits) may be accepted in place of the MS research project/industry rotation to meet MS degree requirements.

By the end of the program, successful graduates will:

- Be skilled in emerging areas of drug target discovery and drug development, especially in studies related to pre-clinical pharmacology, clinical trials, biomarker development, pharmacogenomics, medicinal chemistry and pharmaceuticals.

- Acquire foundational skills and competencies to conduct independent studies in the fields of pharmaceutical and biomedical sciences.
- Master and incorporate cutting edge analytical methods and tools in their research projects (e.g. genomics, proteomics, liquid chromatography, mass spectrometry, bioinformatics, biostatistics and machine learning modeling).
- Be able to design and implement experimental methods to answer specific biological and clinical questions related to health and pharmaceutical sciences.
- Conduct scholarly activities and scientifically rigorous research designed to solve biological and clinical questions. (Required for PhD, optional for MS)
- Develop competency in scientific rigor and scientific communication, manuscript and grant writing. (Manuscript and grant writing required for PhD only)
- Become an independent research-oriented investigator in the field of pharmaceutical sciences. (PhD).