



**Graduate School
of Biomedical Sciences
Department of Biomedical Sciences
Master of Science Degree Program**

BIOTECHNOLOGY

HANDBOOK 2012-2014

(available on-line

<http://www.hsc.unt.edu/departments/bmsc/Specialized%20Master's%20Programs.cfm>)

Biotechnology Masters Degree Program

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Program Description

Biotechnology has been defined as 1) a collection of technologies that capitalize on the attributes of cells, such as their manufacturing capabilities, and put biological molecules, such as DNA and proteins, to work for us; 2) the application of molecular and cellular processes to solve problems, conduct research, and create goods and services; 3) a cluster of industries that rely on insights into the way living organisms function; and 4) the use of technology and biology to investigate development of new medicines and pharmaceuticals, devices, and methods, including but not limited to new methods of DNA fingerprinting, wildlife management and conservation.

The master's degree in the Biotechnology Program will provide a strong foundation upon which to build a career. The rigorous curriculum focuses on providing students a broad-based view of the biomedical sciences, as well as in depth knowledge of lab management and industry practice, ethical issues, and laboratory skills necessary to prepare the student for a career in the biotechnology and life science industry. This program is designed to train individuals for careers in industry and research by providing the tools and experience needed for highly technical positions offered in emerging biotechnology companies, life science organizations, and research institutions. Candidates for the degree earn approximately 54 SCH of which 32 SCH are core requirements, 10 SCH are laboratory technique courses and 12 SCH are a laboratory Internship Practicum, the latter substituting for a thesis requirement. The program is usually completed in two years. Students are only admitted in the summer semester.

As part of the Biotechnology Program, all students will complete a 2-semester (32 weeks, 40 hours/week) Internship Practicum in biotechnology and use this experience to write a detailed Internship Practicum Report pursuant to receiving the Master of Science degree. The average time to complete the degree is 2 years.

Each student is responsible for the completion of the requirements for the Master of Biotechnology Program according to the procedures that follow. Each item must be completed in the sequence and time period indicated. Forms are subject to revision at any time and should be obtained from the Graduate School of Biomedical Sciences.

Opportunities for Graduates in Biotechnology

Biotechnology in the United States is a dynamic industry and there are many opportunities for employment. When considering a career in biotechnology, most people think of a scientist in a white coat in a laboratory developing drugs to improve the quality of life. However, biotechnology has a wide variety of career opportunities ranging from sales and marketing, to research and development, to manufacturing and quality control and assurance. The biotechnology industry continues to flourish nationwide. Not only are the total number of biotechnology companies increasing, but employment in the biotechnology field continues to grow as well since the number of employees has increased by more than 90 percent.

There are many career options for someone with a graduate degree in biotechnology. Career options include: a Bioinformatician helps to design, develop and use tools for gaining information about biotech procedures, implement these tools and analyze the data obtained from them. A Biotechnical Scientist works as part of a team of scientists under the direction of a group leader on a given product. A Consultant provides advice and support in product development, process implementation, forensic analysis, manufacturing, and management recruitment and training. Their goal is to identify possible problems or issues and help trouble-shoot them, ensuring optimal client returns on investment. An Industry Researcher is a professional who helps define the range and scope of new areas of research.

Admissions Requirements

The admissions committee will review all applicants for acceptance into the program. A student must have a bachelor's degree and must meet the general requirements listed in the catalog in effect at the time of application. In addition, the Graduate Record Exam (GRE) is required for admission to this program and applicants must have completed the following prerequisites: general or inorganic chemistry (8 SCH), biology (14 SCH), physics (8 SCH), organic chemistry (8 SCH), English (6 SCH), and calculus or statistics (3 SCH).

All applications must be completed and received in accordance with the deadlines published in the academic calendar. Electronic application records will be updated before letters are mailed. Applicants may check their application records online at <http://my.hsc.unt.edu> for admissions decisions. No admissions decisions will be released by phone.

A bachelor's degree or its equivalent from a regionally accredited institution.

A competitive grade point average; in general, 3.0 or higher.

An official GRE score. There is no minimum GRE score requirement. In general, a composite score of at least 1100 with an analytical writing core of 3.5 is considered competitive (revised GRE – composite score of at least 310). The GRE is not the only consideration for acceptance into the program; we consider the entire application package. The GRE may be waived if the applicant holds a terminal degree (Ph.D., M.D., D.O., etc.) If the applicant is an M.D. they must be licensed to practice in the U.S.

The UNTHSC at Fort Worth requires an applicant from a foreign country to demonstrate satisfactory proficiency in oral and written English before being granted admission in addition to supplying official documentation of minimum scores for the Test of English as a Foreign Language (TOEFL) or the International Language Testing System (IELTS) exam. Upon acceptance, if it is determined that a student is not proficient in the English language, he/she will be required to complete an approved English as a Second Language (ESL) course at his/her own expense.

Support

In general, master's students do not qualify for teaching assistantships. They are, however, eligible to apply for the Elena and Thomas Yorio Scholarship for First-Year Students and the Rachel Dauphin Memorial Scholarship.

Program Requirements

Each student is responsible for the completion of the requirements for the program according to the procedures that follow. Each item must be completed in the sequence and time period indicated. Forms are subject to revision at any time and should be obtained from the Graduate School of Biomedical Sciences' web site.

The admissions committee will review all applicants for acceptance into the MS in Biotechnology Program. A student must have a bachelor's degree and must meet the general admission requirements as described in the catalog in effect at the time of application. All applications must be completed and received in accordance with the deadlines published in the academic calendar. A student admitted into the Master of Science program in biotechnology must take a minimum of 9 semester credit hours (SCH) per long semester and 6 SCH during the summer (24 SCH/year). A minimum GPA of 3.0 must be maintained.

By the end of the second semester or before, usually six weeks prior to starting the internship, the student will be assigned a major professor and an advisory committee consisting of the major professor and two other graduate faculty members. The names of these individuals must be filed in the GSBS Office of Admissions and Services prior to starting the internship or no later than one week after starting. In addition, a degree plan must also be filed with the GSBS Office of Admissions and Services at this time. Forms may be obtained from the Graduate School of Biomedical Sciences' web site.

During the fall and spring semesters of the second year, the student will enroll in Internship Practicum (BMSC 5997). The internship will be at a site previously approved by the advisory committee. The student is responsible for transportation to and from the site, whether it is on-campus or off-campus. During this time, the student will gain experience in tasks associated with the application of biotechnology in an industrial setting. The student should not expect to receive a stipend or other monetary compensation for the internship. A formal plan (research proposal) describing how the practicum is to be spent must be approved by the advisory committee and submitted 4 weeks after starting the internship. The Research Proposal Approval form may be obtained from the Graduate School of Biomedical Sciences' web site.

At the end of Internship Practicum (BMSC 5997), students will present their work as both oral and written reports. The oral presentation will be open to the public and will then be followed by a private defense with the advisory committee. The student must submit a first draft of his/her internship practicum report and internship daily journal to the major professor prior to the public seminar for review. The major professor must approve the internship practicum report prior to

the student submitting it to advisory committee members. The final written report should be given to the committee no later than two (2) weeks before the formal defense. Students should coordinate the reservation of a seminar room with the Graduate School office no later than one (1) month prior to their defense. At this time the committee will either approve/or not approve the work of the internship and the report. If disapproved, the student may have a chance to revise the report or repeat the practicum one time at the discretion of the committee. The major professor together with the other members of the committee will assign a letter grade to the practicum. The report must be submitted in accordance with the instructions for completing graduation requirements within the deadlines for graduation published in the academic calendar. A more detailed description of the internship practicum and report requirements may be found in the Internship Practicum Guidelines available on the GSBS graduation website.

It is strongly suggested that the student and major professor communicate on a regular basis to review the student’s progress during the Internship Practicum.

Internship Practicum (BMSC 5997) provides a hands-on training experience for the biotechnology student. UNT Health Science Center will identify approved, off-campus internship opportunities in north Texas and will work to place students at suitable sites. From time to time, opportunities may exist in other parts of the state or country. It is also possible that occasional opportunities will exist on the campus. The internship takes approximately 2 semesters (32 weeks, 40 hrs/week) during which the student will be working under the direct supervision of an internship mentor at the internship location. The student is expected to keep a laboratory notebook/daily journal during this experience. At the end of the practicum, the student will write a report detailing the activities of the internship. The student’s advisory committee must approve this report together with the laboratory notebook. The student must make a formal presentation to the advisory committee and defend the work at this time. A copy of the report must be submitted within the appropriate deadlines for graduation (see the Academic Calendar).

Biotechnology Curriculum

The following curriculum is required for all students enrolled in the Biotechnology Program:

Year 1

Summer 1

BMSC5400.002	Biostatistics for Biomedical Science	4 SCH
BMSC 5900.001	Short Course in Health Disparities	1 SCH
MOLB 5201.002	Introductory Biochemistry	2 SCH

Fall 1

BMSC 5301	Integrative Biomedical Sciences CORE I: Principles of Biochemistry	4 SCH
BMSC 5302	Integrative Biomedical Sciences CORE II: Molecular Cell Biology	4 SCH
BMSC 5303	Integrative Biomedical Sciences CORE III:	2 SCH

BMSC 5160	Immunology and Microbiology	1 SCH
BMSC 5250	Biomedical Ethics	2 SCH
BMSC 5310	Laboratory Management	3 SCH
BMSC 5170	Scientific Communications	1 SCH
	Techniques in Biomedical Sciences*	
Spring 1		
BMSC 5304	Integrative Biomedical Sciences CORE IV: Physiology	5 SCH
BMSC 5305	Integrative Biomedical Sciences CORE V: Pharmacology	2 SCH
BMSC 5165	Introduction to Industry Practice	1 SCH
BMSC 5140	Seminar in Current Topics	1 SCH
BMSC 5170	Techniques in Biomedical Sciences*	2 SCH
Summer 2		
CBAN 6440	Methods in Molecular Biology	4 SCH
BMSC 5170	Techniques in Biomedical Sciences	2 SCH
Year 2		
Fall 2		
BMSC 5697	Laboratory Internship Practicum	6 SCH
Spring 2		
BMSC 5697	Laboratory Internship Practicum	6 SCH
Total Course		54 SCH

*Students must take a total of 5 SCH in Techniques in Biomedical Sciences or Laboratory Rotation courses.

UNTHSC reserves the right to make changes at any time to reflect current board policies, administrative regulations and procedures, amendments by state law and fee changes. Information provided in this document is subject to change without notice and does not constitute a contract between the University of North Texas Health Science Center and a student or an applicant for admission. The institution is not responsible for any misrepresentation or provisions that might arise as a result of errors in preparation.

Course Descriptions

Core Courses:

BMSC 5301. Integrative Biomedical Sciences I: Principles of Biochemistry.

3 hours. A broad introduction to the fundamentals of biochemistry, especially those relating to thermodynamics, molecular pathways and regulation. Discussion of important techniques that contribute to our present understanding of biochemistry. Offered each Fall. Course restricted to Medical Sciences and Clinical Research

Management majors. Letter Grade.

BMSC 5302. Integrative Biomedical Sciences II: Molecular Cell Biology.

3 hours. The fundamentals of cell and molecular biology, concentrating on understanding of the experimental basis of these disciplines as well as the current state of knowledge. Offered each Fall. Course restricted to Medical Sciences and Clinical Research Management majors. Letter Grade.

BMSC 5303. Integrative Biomedical Sciences III: Immunology and Microbiology.

2 hours. A general exploration of basic concepts of immunology, microbiology and virology including study of genomics, proteomics and gene therapy. Course restricted to Medical Sciences and Clinical Research Management majors. Offered each Fall. Prerequisites: BMSC 5301 and 5302 or consent of the department. Letter Grade.

BMSC 5304. Integrative Biomedical Sciences IV: Physiology.

4 hours. Emphasis on integrative physiology of human organ systems. Offered each Spring. Course restricted to Medical Sciences and Clinical Research Management majors. Prerequisites: BMSC 5301 and 5302 or consent of the department. Letter Grade.

BMSC 5305. Integrative Biomedical Sciences V: Pharmacology.

2 hours. Emphasis on fundamental principles of pharmacology that include pharmacodynamics, pharmacokinetics, ligand-receptor interactions and their consequent biological effects. Course restricted to Medical Sciences and Clinical Research Management majors. Offered each Spring. Prerequisites: BMSC 5301 and 5302 or consent of the department. Letter Grade.

Additional Courses:

MOLB 5201.002. Introductory Biochemistry. This introductory course in biochemistry is intended to provide undergraduate and graduate students with a foundation and in-depth knowledge of biochemistry. This course will cover many aspects of biochemistry including biomolecules and metabolism. The course consists of lectures Letter Grade.

CBAN 6440. Methods in Molecular Biology.

4 hours. An intensive laboratory course designed to give students the expertise to perform basic techniques currently utilized in cell and molecular biology. Techniques will include plasmid preparation; isolation of cDNA inserts from various plasmids; extraction of nucleic acids; agarose gel electrophoresis; Northern and Southern blot analyses; cDNA cloning; sequencing and analysis; PCR amplification; protein gel electrophoresis; and immunoblot analysis. Prerequisite: graduate-level biochemistry. Offered each Summer. Letter Grade.

BMSC 5140. Seminar in Current Topics.

1 hour. Student will attend 15 lectures of current interest presented by students and/or invited speakers throughout the institution. Attendance is mandatory. May be repeated for credit. Offered Fall and Spring. Letter Grad

BMSC 5160. Biomedical Ethics.

1 hour. Covers major ethical issues in biomedical sciences, including: authorship and intellectual property; conflict of interest; data selection/research design; privacy and confidentiality; discrimination and sexual harassment; misconduct and whistle-blowing; animals in research; human subjects in research; implication of funding sources for research. Offered each Fall. Letter Grade.

BMSC 5165. Introduction to Industry Practice.

1 hour. Introduction to the practice of industry science with an emphasis on good laboratory practice, new drug applications, FDA regulations, clinical trials and biotechnology transfer. Course graded on pass/fail basis. Offered each Spring. Letter Grade.

BMSC 5170. Techniques in Biomedical Sciences.

1 hour. A practical course in techniques. Students will participate in laboratories demonstrating up-to-date techniques in biomedical sciences. A listing of the techniques of participating laboratories is available in the schedule of classes. Offered each semester. Letter Grade. Must take at least 5 SCH before internship.

BMSC 5231. Introduction to Health Disparities Issues in the United States

2 hours. An examination of the disparities and issues surrounding the treatment of several health problems in the United States, particularly as related to minority populations. Each health condition is approached from the clinical, cultural and scientific aspect so that the student will understand the etiology and treatment of the disease, the cultural characteristics of various populations that may contribute to the disproportionate presence of the disorder in a particular population, and the underlying science involved with each health problem. The latter understanding will aid the student to better approach research, both in the clinical and basic science venues, directed towards better management of the health problems. Offered each Fall. Letter Grade.

BMSC 5250. Laboratory Management.

2 hours. This course will introduce students to the tools businesses use everyday to increase efficiency, improve operations, and succeed. These tools can be used in the laboratory to improve turn-around time, lower costs, introduce new testing services, and help to increase quality. There are no prerequisites for this course, however a financial calculator is strongly recommended. Offered each Fall and Spring semester. Letter Grade.

BMSC 5310. Scientific Communications.

3 hours. The purpose of this course is to develop skills and gain experience in the types of scientific writing required for: submitting articles for publication; grant applications; preparing presentations for lectures and seminars; preparing posters for meetings. Offered Fall and Spring semesters. Letter Grade.

BMSC 5400.002. Biostatistics for Biomedical Sciences.

4 hours. Statistical methods and experimental design; descriptive statistics; data presentation; parametric and non-parametric methods of hypothesis testing including two-sample tests, analysis of variance, regression and correlation analyses; introduction to multivariate statistics. Competency with computer statistical packages is developed. Offered each Summer. Letter Grade.

BMSC 5697. Internship Practicum

6 hours. The candidate must complete an internship at an approved site. At the completion of the practicum, the student will write a report detailing the activities of the internship. A copy of the report must be submitted within the appropriate deadlines to the graduate school according to the guidelines for completing the requirements for graduation. Offered each semester. Satisfactory/Unsatisfactory until semester of graduation. Letter grade for final semester.

Internship Practicum Sites

North Texas companies that have expressed an interest in possibly partnering with UNTHSC in the Biotechnology Program include:

Molecular Biology & Immunology (UNTHSC)
Investigative Forensics (UNTHSC)
Healthpoint (Fort Worth)
Mary Kay (Dallas)

Other possible locations for internships include companies outside of North Texas and select faculty laboratories at the UNT Health Science Center involved with industry-sponsored research projects.

Students are free to identify internship opportunities on their own initiative, subject to the approval by the Graduate School.

Description of the Student Internship Practicum

Function and Grading of the Student Internship Practicum

The Internship Practicum provides a hands-on training experience for the graduate student whose Master's degree will be in the specialized discipline of biotechnology. The Internship Practicum is an approved course (BMSC 5920) offered through the Department of Biomedical Sciences, Graduate School of Biomedical Sciences. The student will receive either an "Unsatisfactory (U)" or a "Satisfactory (S)" for all semesters enrolled in the Internship Practicum, until the semester the student graduates. At the end of this semester, when the student completes all requirements for the Internship Practicum, he/she will receive a letter grade. Only this letter grade will contribute to the overall GPA. The U/S grades will not be figured into the overall GPA.

UNTHSC will identify approved, off-campus internship opportunities in North Texas and will work to place students with suitable sponsors. From time-to-time, opportunities may exist in other parts of the state or country. For all internship opportunities, students will be expected to provide for their own transportation and housing needs during the internship experience.

Students are free to identify internship opportunities on their own initiative. All such opportunities must be approved by the Graduate School. Requests for approval of a student-identified internship opportunity must be received by May 1.

UNTHSC does not offer any remuneration to the student when he/she is enrolled in BMSC 5920 and the student should not expect to be paid as an intern. If an internship site offers a stipend, the site will determine the amount and conditions. All interactions concerning the stipend will take place between site administration and the student. No student should consider that the internship site has any obligations to pay, hire or in anyway retain a student during or after the internship or after graduation. If the site offers to remunerate the intern while he or she is registered in BMSC 5920, the student will not attempt to collect unemployment compensation after completion of BMSC 5920 or the master's program.

Duration and Time of the Internship

The internship takes approximately 2 long semesters (minimum 32 weeks, 40 hrs/week) during which the student will be working under the direct supervision of an Internship Mentor at the internship location. If the student does not complete the Internship Practicum in the time frame stipulated in his/her program, the student may register for additional hours of BMSC 5920. During the Internship Practicum, students will be available 5 days a week, usually from 8:00 a.m. until 5:00 p.m., however the exact work schedule will be determined at each internship site.

Activities During the Internship

During the internship, the Major Professor, graduate faculty Advisory Committee, and site administrator(s) will assign the student responsibilities that have been previously agreed upon and approved in the Internship Practicum Proposal. Details about the components and formatting of the Internship Practicum Proposal are outlined in a separate section in this handout. The student will work under the guidance and direction of an Internship Mentor at the internship site.

As part of the internship, the student will be required to keep a daily journal of his/her activities. The Internship Mentor will review and sign-off on the journal each week. The journal will form part of the basis for the student's final report and must be turned in to the student's Advisory Committee along with the final Internship Practicum Report.

Proprietary Studies and Agreements

The Internship Mentor will also work with the student to ensure that no proprietary information is contained within any public documents submitted by the student to UNTHSC. For example, if a student is involved with a proprietary drug study, without approval by internship partner, the name of the drug will not be identified in the Internship Practicum Proposal, the daily journal, or the Internship Practicum Report, but will be designated by a code as approved by the Internship Mentor. In addition, before beginning the internship, the student will sign confidentiality agreements as required by the internship partner.

The Student's Advisory Committee and the Internship Practicum Report

Each student will be assigned a minimum three-person Advisory Committee. This committee will include the Major Professor and two other members of the graduate faculty of UNTHSC. The Internship Mentor will also be included on the committee. It is the responsibility of the Advisory Committee to oversee the internship, writing of the Internship Practicum Report, and defense.

The Internship Practicum Report will consist of a detailed account of the activities performed during the internship as agreed upon in the Internship Practicum Proposal. The students will be briefed before and during the internship as it relates to the required format. Please refer to Section "Guidelines for Final Internship Practicum Report and Defense" in this handout.

The Oral Defense

The student must file an "Intent to Defend" form in the Graduate School no later than one month before the date of the oral defense. Each student must present his/her practicum work to the public in a formal lecture and then defend it in front of the Advisory Committee in private immediately after the public presentation. After submitting the Internship Practicum Report to the Advisory Committee (at least 2 weeks prior to the defense), it is the student's responsibility to set up his/her oral defense. All members of the Advisory Committee must be in attendance. In

addition, the student should contact Ms. Amanda Griffith in the Graduate School to set up a lecture room and advertise the oral presentation. This should be done 2 weeks prior to the defense.

Expectations and Focus of the Internship Practicum

Expectations

The Internship Practicum (BMSC 5920) for the Biotechnology Program should take place in an environment where the student is provided tools and experiences that will further the student's pursuit of a career in biotechnology or the life sciences. The student will work under the daily guidance of an onsite Internship Mentor and will be exposed to activities typical for professions utilizing biotechnology skills. Examples include, but are not limited to, wet laboratory techniques, statistical analyses, literature searching, and project management. Students will function and practice under the supervision of the Internship Mentor, and may assist or observe other site personnel.

As part of the Internship Practicum the student will be assigned to a project involving activities that will allow him or her to explore more fully aspects of biotechnology and its applications in an industrial setting. This project will form the basis of the student's Internship Practicum Report, which is described in more detail elsewhere in this handbook.

At the end of the program, it is expected that the student will possess the tools and confidence to pursue a career in biotechnology or life science either at an academic, industry or sponsor site.

Role of the Committee Members

Major Professor

Each student will be assigned a Major Professor. The student should be made to feel that he/she may come to this mentor for advice/mentoring as needed. The Major Professor serves as chair of the Advisory Committee and thus, is responsible for overseeing the professional development of the student and assisting the student to optimize his/her entire educational experience. It is also the Major Professor's responsibility to read the student's Internship Practicum Proposal and Internship Practicum Report before these go to the entire Advisory Committee and give feedback on each to the student in a timely manner. The student will then use this feedback to revise the document in question before handing it to the other members of the committee.

The Major Professor gives the interim satisfactory/unsatisfactory practicum grades after consulting with the Internship Mentor and, along with the rest of the Advisory Committee, determines the final letter grade for the Internship Practicum.

Advisory Committee

Each student will be assigned an Advisory Committee. The committee guides the student in determining internship goals. The Advisory Committee reviews and approves the Internship Practicum Proposal, administers the final defense examination for the degree, approves the Internship Practicum Report before submittal to the Graduate School and determines the final grade for the internship.

The Major Professor serves as chair of the Advisory Committee. Advisory committees for Master of Science students must include at least two additional graduate faculty members*.

Each student is required to meet with his/her Advisory Committee before beginning the BMSC 5920, Internship Practicum and as necessary until the final defense.

A degree plan listing all courses must be completed by the student, approved by the student's Advisory Committee and submitted to the graduate dean before the completion of 24 SCH. All subsequent requests for degree plan changes must be approved by the student's Advisory Committee and submitted in writing by the Major Professor to the graduate dean.

*Individuals at the internship site with master's degrees or higher may be designated Category I graduate faculty in order to become members of the Advisory Committee.

Internship Mentor

The student will work under the guidance and direction of an Internship Mentor at the internship site and thus, the Internship Mentor will play a critical role in the success of the internship experience. The Internship Mentor will be the immediate supervisor of the student at the internship site. This individual will be an employee of the internship partner. The Internship Mentor will be a member of the Advisory Committee. The Internship Mentor provides oversight and guidance while the student is being trained. In some cases, the Internship Mentor and the Major Professor may be the same individual.

As part of the internship, the student will be required to keep a daily journal of his/her activities. The Internship Mentor will review and sign-off on the journal each week. The journal will form part of the basis for the student's Internship Practicum Report and must be turned in to the student's Advisory Committee along with the Internship Practicum Report.

Timetable for the Internship Practicum

The internship will take 2 consecutive long semesters (minimum 32 weeks, 40 hrs/week).

Date	Task
May 1	Deadline for submission to GSBS for approval of any student-identified internship opportunities.
August	Assignment of internship site and advisory committee
August	Pre-Internship Orientation Meeting
End of August	Student contacts internship site and committee members; student arranges a committee meeting at the internship site to discuss internship and practicum project. Student can start on-site as soon as day after this meeting took place.
Sept. 1-May 30	On-Site Internship for 9 months (6 SCH fall; 6 SCH spring).
First 4 weeks	Student prepares Internship Practicum Proposal (the student will be working at the site in addition to writing the proposal).
Middle of November	Major Professor and Internship Mentor review draft Internship Practicum Proposal. Edited draft is sent to other Committee Members for review.
End of November	Advisory committee meets to review/approve final research proposal. Agreement can be obtained via email.
By November 30	Internship Practicum Proposal completed and signed by all Committee Members and filed in the Graduate School.
End of Fall Semester	Major Professor enters Fall Semester Grade (“S” or “U”)
January 1	Student checks deadline and file for graduation. (submit form “Intend to Graduate”)
February	Student calls an advisory committee meeting early in October to go over his/her proposed practicum report outline (or may meet with members

individually). Student starts drafting actual Practicum Report while continuing to intern at the site. Student and Committee sets defense date.

Student starts drafting actual Practicum Report while continuing to intern at the site.

Student schedules room and technical services.

Feb/March

Student files 'Intent to Defend' form in the Graduate School (at least 1 month prior to defense).

March/April

Major professor reviews first draft of report. Other Committee Members review Practicum Report no later than 2 weeks prior to scheduled defense. Student sets defense date and schedules room and technical services. The "Intent to Defend" form must be filed at least 1 month prior to defense date in the Graduate School.

April

Student focuses 100% on completion of Internship Practicum Report, preparing presentation and practicing presentation with Major Professor

End of April

Student defends Internship Practicum Report. All members of Advisory Committee MUST be present.

Immediately following defense

Student makes final edits to Internship Practicum Report and submits to the Graduate School.

Comply with last day to complete all requirements for spring confirmation of degree.

Research Proposal Guidelines for the Internship Practicum Reports

Many studies end in futility or waste considerable amounts of time because the student begins the project with only a meager understanding of the area under consideration and no real plan or road map. To be successful, the student should have a detailed plan as well as an overall conceptualization of the study. The Internship Practicum Proposal for the Internship Practicum allows the student to specify the problem/activities that will be pursued during the internship; to elaborate on the significance of the study to a particular profession; to review related literature; and outline the appropriate methodology employed in the study within a reasonable time-frame. The proposal serves as a “road map” for the activities to follow. The student has 4 weeks to finalize the proposal after starting the internship and in general it will contain the following components:

- I. **Summary:** Provide a few concise paragraphs that describe the environment where the work will be done, what the focus of the Internship Practicum work will be, and what other general on-the-job training activities will be accomplished.
- II. **Specific Aims:** A concise and clearly written statement describing the focus and direction of the Internship Practicum problem, listing the specific aims and the means (tools) that will be applied to meet the objectives of the internship goals. Depending on the nature of the research this may consist of stating and testing a hypothesis.
- III. **Significance:** An opportunity to explain why the Internship Practicum project is important; justify the study or internship objectives by explaining how the project will further knowledge and extend theory. (One-two paragraphs) Note: To determine the significance, you must know the literature!
- IV. **Background:** Provide a review of the literature (with at least 10 citations) that provides important insight into the problem to be studied or study objectives to be met. The literature and arguments should help the reader to understand the importance and industrial relevance of the proposed activities.
- V. **Preliminary Data:** If available, publishable and applicable, preliminary findings, demonstration of methodology or preliminary tools etc. may be included. Very few proposals have this section.

VI. Internship Practicum Design and Activities:

This section describes in detail the main Internship Practicum objectives (specific aims) and existing or new methods to be used to reach the set goals.

Description of Internship Practicum site environment

Describe procedures, techniques, methods, software, data collection tools, project management tools, etc. you will use or develop.

Describe data collection sampling techniques and analysis plan to be employed.

Describe any potential pitfalls that may arise and alternate means to approach the problem.

Describe any key factors that will limit your ability to interpret the data or interfere with the planned timeline for collection/analysis of the information.

VII. General Internship Experience: Provide insight into the broad range of tasks, including administrative or managerial responsibilities observed or conducted during the internship, also the ones that are not immediately related to the main focus of the internship experience.

VIII. Bibliography*: List all references cited in the proposal using an accepted form of scientific citation. Choose whether you will use the name system, e.g. (Miles et al, 2004), or the number system, e.g. (1) through (n). Then, be consistent! Unless the idea is totally your own, cite a source. Failure to do so is plagiarism!

* There are several evidence-based full-text and abstracting services available through online computer services at the library. These databases can save the student an immense amount of time when seeking high-quality evidence-based information. Examples are: MEDLINE, PubMed and TRIP. If you've never used these services, ask a librarian for assistance. Use primary sources (books and journal articles) not information gathered from non-reviewed internet sites in your literature review.

NOTE: The student should read the requirements, consult examples for writing the Internship Practicum Report and work closely with the Major Professor before beginning to actually write either the proposal or the final document. They are highly encouraged to ask assistance in the library for properly and efficiently conducting on-line searches and to use a citation software program such as END-NOTES, Stat-Ref or RefWorks.

Guidelines for the Final Internship Practicum Report and Defense

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At the beginning of the Fall term of the second year, the student will enroll in BMSC 5920 (9 SCH), the Internship Practicum. The Internship Practicum will continue in the Spring semester of the second year (9 SCH) so upon completion, the student will have spent a total of 2 semesters in the internship (**approximately September 1 - May 30**).

Once a student has enrolled in BMSC 5920, he/she must maintain continuous enrollment until the Graduate School has accepted the final Internship Practicum Report. Failure to maintain continuous enrollment will either invalidate any previous BMSC 5920 credit or will result in the student's dismissal from the degree program, unless granted an official leave of absence by the graduate dean for medical or other exceptional reasons.

At the end of BMSC 5920, the student must submit the Internship Practicum Report and daily journal, approved by the Internship Mentor, to the Major Professor and Advisory Committee. The Advisory Committee will meet with the student to approve the work of the internship and the report. Corrections may be suggested at this time. The completed/corrected Internship Practicum Report should be submitted to the Advisory Committee **at least two weeks prior to the defense**.

Just prior to the defense (same day), the student will present a formal public seminar pertaining to the report. The Advisory Committee (and Internship Mentor) will administer the final oral defense of the Internship Practicum Report and related work in private immediately following the seminar.

Four copies of the corrected Internship Practicum Report must be bound for institutional use. These are distributed to the Major Professor, major department and the reference section of the Gibson D. Lewis Health Sciences Library. An additional copy is also required. This fourth copy will remain unbound in the library archives.

The Internship Practicum Report must be prepared for digital submission according to the instructions in the Guidelines for Filing Theses, Internship Practicum Reports and Dissertations (available online at <http://hsc.unt.edu/education/gsbs> under Forms). The body of the Internship Practicum Report in general will contain the following chapters:

- Chapter I: Introduction
- Chapter II: Internship Subject
 - Background and Literature Review
 - Specific Aims
 - Significance

Materials and Methods
Results and Discussion
Summary and Conclusions
Chapter III: Internship Experience
Internship Site
Journal Summary (refer to addendum for complete day-today log of activities)

The Oral Defense

The student must file an “Intent to Defend” form in the graduate school approximately one month before the date of the oral defense. Each student must present his/her practicum work to the public in a formal lecture and then defend it in front of the Advisory Committee in private immediately after the public presentation. The student should plan on a minimum 45 minute presentation, allowing an additional 15 minutes for questions from the audience. The student should plan for an additional 2 hours for the private defense. It is the student’s responsibility to set up his/her oral defense and private defense. All members of the Advisory Committee must be in attendance. The student must contact Ms Amanda Griffith in the graduate school to set up a lecture room and advertise the oral presentation. This should be done at a minimum of 1 month weeks prior to the defense. In addition, the student must contact the graduate secretary in the Department of Cell Biology and Genetics to arrange for public advertisement of the defense seminar date and time.

Criteria for Consideration of the Internship Practicum Grade Assignments

The Internship Practicum is an approved course (BMSC 5920) offered through the Department of Biomedical Sciences, Graduate School of Biomedical Sciences and is a requirement for the Master’s degree in the Biotechnology Program. The student will receive either an “Unsatisfactory (U)” or a “Satisfactory (S)” for all semesters enrolled in the Internship Practicum, until the semester the student graduates. At the end of this semester, when the student completes all requirements for the Internship Practicum, he/she will receive a letter grade. Only this letter grade will contribute to the overall GPA. The U/S grades will not be figured into the overall GPA.

The final letter grade is a reflection of performance throughout the internship, public seminar, and private oral defense as well as quality of the final Internship Practicum Report. The letter grade is determined by the entire Advisory Committee after conclusion of the defense, whereas the Internship Practicum grade(s) prior to the final letter grade is (are) determined by the Major Advisor and Internship Mentor.

- **Suggested rating scale for the final practicum semester grade: Excellent = A; Above Average = B; Average-Poor = C; Failing = F**

- For the Internship Practicum grades prior to the last semester: A “Satisfactory (S)” should reflect A/B/high C work; An “Unsatisfactory (U)” indicates low C and below.

Suggested Criteria

1. Attendance
2. Met all requirements in a timely manner, including filing of appropriate forms
3. Observed accepted standards of professional behavior, e.g. academic integrity, proper behavior in dealing with the public, dress etc.
4. Regularly and actively participated in the activities, both research and educational, of the Internship Practicum
5. Commitment, drive, determination, perseverance
6. Creativity, imagination, in terms of problem interpretation as well as problem design
7. Technical ability
8. Keeps up with and understands the literature
9. Effectively completes tasks
10. Ability to write clearly
11. Ability to speak clearly and answer questions knowledgeably
12. Leadership qualities
13. Organizational skills (e.g. good record keeping and well prepared notebooks) and time management skills.
14. Appropriate demonstration of independence
15. Overall depth of understanding of the Internship Practicum problem and its significance to the general field of study and internship partner.
16. Pays attention to detail.

Forms Required Prior/During the Internship Practicum

Internship Practicum Advisory Committee Meetings and Required Forms

Advisory Committee Meetings

It is the student’s responsibility to schedule and coordinate dates, times and meeting rooms for Advisory Committee meetings. The student should schedule his/her oral defense date, time and place at least 4-5 weeks prior to the planned date, to make sure ALL committee members can be present.

Required Forms and Signatures

There are several Forms that must be completed and filed with the Graduate School office during the course of the program. The required Forms (see attached) can be obtained on the website. The names and degrees of the individuals who will sign the form need to be TYPED IN under their respective signature lines, prior to printing the forms out and collecting the signatures.

Students, who have been assigned 4 rather than 3 Advisory Committee members, need to ADD a signature line on the forms for this additional member. For any given form, the students are only responsible to obtain the signatures of their committee members. The signatures from the Dean, Graduate Advisor, Practicum Coordinator or GSBS office representative will be collected internally after the student drops off the forms. All Forms are to be submitted to the Graduate Office.

Dr. Vishwanatha's and Dr. Gwartz's signatures will be collected by a representative of the Graduate Office, **after** all other required signatures have been collected by the student.

Who signs where? (type in the names and degrees before you require processing):

Graduate Advisor: Patricia Gwartz, Ph.D., FACC

Program Director: Patricia Gwartz, Ph.D., FACC

GSBS Approval: Carla Lee

GSBS Office: Carla Lee

Department Chair: Jamboor Vishwanatha, Ph.D.

Graduate Dean: Jamboor Vishwanatha, Ph.D.

Forms Required:

Pre-Internship agreement

"Master of Science-Degree Plan"

If not already submitted (before completion of 24 SCH), student brings this form to first committee meeting and obtains signatures prior to dropping the forms off in the Graduate Office.

"Master of Science- Designation of Advisory Committee"

Student brings this form to first committee meeting, collects signatures of all committee members and drops off in the Graduate Office for internal processing.

“Master of Science- Research Proposal”

Student collects all committee members’ signatures, attaches approved final research proposal, and drops the documents off in the Graduate Office for internal processing.

“Declaration of Intent to Graduate”

Form to be completed and filed by student in Graduate Office after collecting required signatures. To be filed **no later than date** listed on website for semester student plans to graduate.

“Declaration of Intent to Defend”

To be completed and dropped off in Graduate Office by student, **no later than 30 days prior to actual defense date**.

“Master of Science- Report of the Final Comprehensive Examination (Defense)”

Student brings this form to the defense for Advisory Committee members to sign. Student must file this signed form with the Graduate School after the committee has assigned a Pass, Repeat or Fail grade, based on recommendation of all committee members. Student is allowed to turn in the signed form along with the other graduation materials.

“UMI Publishing Agreement”. Students completing a practicum reports, thesis or dissertation, must upload your document to UMI. You are responsible for submitting an electronic document that is EXACTLY the same as that approved by your advisory committee

“UNTHSC Electronic Document Filing Form”

Hard (paper) copy of your thesis/practicum report manuscript complete with signature page (without Dean's signature).

“Graduation Clearance Form” - requires signatures from Campus Police, ITS, Graduate Advisor, Student Financials, Office of Financial Aid.

“Degree Candidate Information Form”

“Confirmation of Survey of Graduating Students”