I. Program of Study

The program in Biotechnology offers a Master of Science degree. At the time of admission into the Biotechnology program, all students are subject to the requirements listed in the Texas Tech University Health Sciences Center Student Handbook (Code of Professional and Academic Conduct), the Graduate School of Biomedical Sciences Catalog, as well as the guidelines given below.

The program only admits new students in the Fall term.

II. MS Program

A. Prerequisites for Admission: See the GSBS website for a complete list of admission requirements: https://www.ttuhsc.edu/biomedical-sciences/biotechnology/program.aspx

1. A bachelor's degree or the equivalent from an accredited college or university.

2. The applicants’ undergraduate record including grade point average (based on 4.0 system) will be considered as part of the overall application.

3. Graduate Record Examination (GRE) General Test. This is a requirement for all international applicants, but is optional for domestic applicants. The GRE is optional for international students who have earned a degree from an accredited college or university in the United States.

4. Two letters of recommendation, which must be from former faculty or administrators who are familiar with the scholastic abilities of the applicant.

5. A personal interview may be requested.

B. Program Mandates

- All students are required to take the GSBS Core I-IV curriculum courses in the Fall, the Biotechnology core curriculum in the Spring, all Interprofessional Education (IPE) requirements (https://www.ttuhsc.edu/interprofessional-education/core_curriculum.aspx), 6 hours of research and at least 9 months of industry internship or academic research.

- In the Spring semester of the first year of study, students will conduct interviews with companies, regulatory agencies and faculty to determine their placement for their second year research work in the program.

C. Biotechnology Student Checklist (Appendix 1)

D. Sequence of Events Upon Entering the Program
1. **Introductions** – All new graduate students will meet with the Biotechnology Graduate Program Advisor – Irene La-Beck (Abilene) & Komaraiah Palle (Lubbock) (Appendix 2) to chart out first year laboratory rotations and curriculum.

2. **Laboratory Rotations** – In the Fall semester of the first-year curriculum, students take GSBS 5020: Laboratory Methods. Two lab rotations in the Spring semester of the first-year curriculum are also required (GBTC 5337 - Laboratory Methods in Biotechnology Research). All new graduate students will interview with the biotechnology graduate faculty interested in having a student in their lab prior to beginning laboratory rotations. The goal of this interview is to formally introduce incoming students to program faculty members and to determine if the student has an interest in a faculty’s research. Students should ascertain the potential for laboratory rotations and the possibility of a faculty member becoming a mentor (Appendix 3). Interviews must be documented and completed by the end of the Fall term. Upon completion of the interviews, new students will submit their requests for rotations in the Spring semester and confirm this plan with the Graduate Advisor. The two laboratory rotations are expected to run consecutively to fill the full Spring semester. Each faculty member involved will submit a written evaluation for each rotation that must be reviewed with the student. A final rotation grade will be assigned based on the Lab Rotation Rubric (Appendix 4). The signed form will be included in the student’s program file folder.

3. **Program Curriculum** (see also Appendix 6)

### FIRST YEAR CURRICULUM

#### FALL SEMESTER:

All new biotechnology students are required to take core courses I-IV.

- **GSBS 5471 — CORE I: MOLECULES** – This course offers a broad coverage of biochemistry with an emphasis on structure and function of macromolecules, biosynthesis of small molecule precursors of macromolecules, and the pathways of intermediary metabolism.

- **GSBS 5372 — CORE II: CELLS** – The structure/function relationships that underlie basic cellular processes, including translation protein trafficking, cytoskeletal organization and motility, cell adhesion, and cell division.

- **GSBS 5373 — CORE III: GENES** – Teaches essential scientific concepts underlying the field of Molecular biology and Molecular Genetics.

- **GSBS 5174 — CORE IV: BIOMEDICAL SEMINAR** – Students will attend and participate in seminars.

- **GBTC 5020 — LABORATORY METHODS** – Students learn laboratory skills and procedures.

#### SPRING SEMESTER:
1. **GBTC 6201 BIOTECHNOLOGY SEMINAR** - Students are required to attend all seminars sponsored by the Biotechnology Program. Students will present a seminar in their first year.

2. **GBTC 6301 INTRODUCTION TO BIOTECHNOLOGY** – Broad coverage of topics with high current interest and utility to the medical biotechnology industries. Emphasizes application of technologies.

3. **GBTC 6202 BIOMEDICAL INFORMATICS** - Provides a broad introduction to the field of bioinformatics in medical research. Emphasizes use of modern software packages and internet-based genomic and other databases to solve research problems. *Personal laptop required – must meet the School of Medicine laptop specifications.*

4. **GSBS 5101 RESPONSIBLE CONDUCT OF RESEARCH** – Addresses the regulatory and ethical environment of today’s biomedical research as well as such topics as authorship and data management.

5. **GBTC 5337 TECHNIQUES IN BIOTECHNOLOGY RESEARCH** – Through rotations in the laboratories of Biotechnology graduate concentration faculty members, standard experimental techniques used in Biotechnology are explored through a series of hands-on laboratory exercises. The objective of lab rotations is two-fold: (1) allow the student to become familiar with biotechnology faculty to facilitate matching to an academic research lab for the student’s second year research work; (2) allow the student to learn multiple experimental techniques and approaches.

6. **ELECTIVE (3 HOURS)** – preferably taken during Spring

**SUMMER SEMESTER:**

1. **GBTC 7000 (6 hours) RESEARCH** or **GBTC 6001 (6 hours) BIOTECHNOLOGY INTERNSHIP**

2. **Elective (3 hours)** – optionally taken during Summer
   
   may include executive MBA courses

**SECOND YEAR CURRICULUM**

**Year 2 Internship:**

**FALL SEMESTER (INDUSTRY OPTION)**

1. **GBTC 6001 (9 hours) BIOTECHNOLOGY INTERNSHIP**
2. **GBTC 5298 BIOTECHNOLOGY INDUSTRY REPORT**
SPRING SEMESTER (INDUSTRY OPTION)
1. GBTC 6001 (9 hours) BIOTECHNOLOGY INTERNSHIP
2. GBTC 5299 BIOTECHNOLOGY FINAL REPORT

FALL SEMESTER (LAB OPTION)
1. GBTC 7000 (9) RESEARCH
2. GBTC 5199 BIOTECHNOLOGY LAB REPORT
3. Elective (Optional)

SPRING SEMESTER (LAB OPTION)
1. GBTC 7000 (9) RESEARCH
2. GBTC 5299 BIOTECHNOLOGY FINAL REPORT
3. Elective (Optional)

4. Major Advisor and Advisory Committee – The Biotechnology Program Directors and Graduate Advisors will serve as major advisors for the biotechnology graduate students. The Biotechnology Graduate Program Committee will serve as the Advisory Committee to oversee student performance. If a student elects to do research at a TTUHSC laboratory, the PI of that laboratory will assume the role of Major Advisor after approval from the Biotechnology Program Director. The responsibilities of the Major Advisor are to: 1) monitor the progress of the student's research, and 2) establish and maintain financial support for the student to complete his/her research project.

5. Assessment of Graduate Student Progress (Appendix 1):

The Graduate Student Checklist is the major tool for assessing Graduate Student Progress through the degree program. It is the student’s responsibility to ensure that all appropriate forms are signed and filed with the Graduate Program Coordinator according to deadlines. The Assessment of Graduate Student Progress form and the student’s file will be reviewed at the end of the 1st year (May) and again in April of year two by the Program Graduate Committee and summarized on the Biotechnology Student Checklist (Appendix 1). In addition to meeting the Program requirements detailed below it is expected that the student will maintain above average ratings in all required assessment tools. Failure to maintain these standards may result in the student being placed on academic probation or dismissed from the program.

6. Qualifying Exam – Students in the Biotechnology Program do NOT take a Qualifying exam.

7. Completion of the degree program:

A) Thesis Option:

GSBS requires a minimum of 36 hours of graduate course work, which must include 6 hours of research plus 6 hours of thesis.

All didactic class work should be completed by the start of the second year (Appendix 1). The remainder of the student’s tenure in the program is to be spent conducting, publishing and presenting their research.
Intent to Graduate – A student planning to graduate must file in the GSBS office the Statement of Intent to Graduate at the beginning of the semester of intended graduation. Students should check the GSBS Academic Calendar for the graduation deadline dates.

Final Oral Report - Once the committee agrees that the research is complete, plans for the writing and defending a student’s thesis should be made. A draft of the thesis and an abstract must be submitted to the Advisory Committee at least two weeks prior to the final oral examination.

Thesis Defense – Students defend their thesis in a final public seminar followed by a private oral examination by their Advisory Committee. The written thesis must be submitted to the Advisory Committee two weeks prior to the Defense date. Evaluation of the defense and determination of its outcome is documented by the Advisory Committee and reviewed with the student. The results of the defense are recorded on the Thesis Oral Defense form and the Thesis Signature form.

Thesis Copies – The GSBS requires only submission of a .pdf copy of the final version to the graduate program coordinator.

B) Non-Thesis Option:

GSBS requires a minimum of 36 hours of graduate course work, and must include 6 hours of research.

All didactic class work should be completed by the start of the second year (Appendix 1). The remainder of the student’s tenure in the program is to be spent conducting and presenting their research or internship experience.

Intent to Graduate – A student planning to graduate must file in the GSBS office the Statement of Intent to Graduate at the beginning of the semester of intended graduation. Students should check the GSBS Academic Calendar for all graduation deadlines.

Final Written and Oral Report: While students that select the Non-Thesis Option are not required to write and orally defend a MS thesis, the program does require submission of a final written report that should take the form of a peer-reviewable manuscript from a scientific journal of your choosing and which contains the applicant’s research and an oral defense of this manuscript.

III. Expectations for Continuation in the Biotechnology program and Appeals Following Dismissal

The Biotechnology program will follow all GSBS policies and procedures. Additional details on the following are available in the GSBS catalog.

A. Continuation in the Program

Every student enrolled is required to maintain a high level of performance and to comply fully with policies of TTUHSC, GSBS and the Biotechnology Program. The Graduate School of Biomedical
Sciences reserves the right to place on probation or to dismiss any graduate student who does not maintain satisfactory academic or professionalism standing. Students who are conditionally admitted to a degree program are automatically on probation. Failure to fulfill the conditions stipulated at the time of admission will result in dismissal from the program.

Every student is expected to maintain a high level of commitment to professional development in a variety of areas. If any aspect of a student's professional development (for example attention to teaching responsibilities, appropriate growth toward development of critical thinking skills or appropriate progress toward research goals, etc.) is considered to be unsatisfactory by the Biotechnology Program Graduate Committee, the student shall be so informed in writing, along with a description of the recommended corrective action and the period of time allowed for the corrective action to be taken. If the student fails to correct the deficiency, the committee may recommend dismissal of the student from the program.

GSBS students are required to maintain a minimum overall grade point average (GPA) of 3.0. If a student fails to maintain the required minimum GPA in any semester, she or he will be placed on academic probation.

A student on academic probation will need to obtain a GPA of at least 3.0 in every one of the subsequent semesters. A second occurrence of a semester GPA below 3.0 may result in dismissal from the program. A final cumulative GPA of at least 3.0 is required in order to graduate.

Master students may withdraw from a core curriculum class in the first semester and repeat the class if recommended by the course director, graduate advisor and program director. If a class is dropped after the last official drop date with a grade of A, B, or C, then it will show as a W and won’t calculate into the GPA. If a class is dropped with a course average of D or F, then the transcript will show a WF and it will count as F towards the GPA. Students may drop a Core Course for non-academic reasons with a W (and not a WF) at the discretion of the GSBS Dean.

Biotech Master’s students can withdraw from either Core I or Core II, and will be able to continue with Spring classes. Note: Bioinformatics has a prerequisite for successful completion of Core III. A Core Class can only be repeated once in the 2nd year to assure on-time graduation.

B. Appeals and Grievance Process

Student Appeals Policy. This policy applies to specific grievances arising from matters affecting students' academic standing and performance, such as disputes concerning comprehensive examinations and research assistantships. Appeals may be made only when alleged prejudicial, arbitrary or capricious action is involved. The burden of proof of unfair influence or action rests with the student.

A student wishing to appeal a decision or action first should discuss the matter with the faculty member or members involved. If the student is not satisfied with the outcome of this effort, the student should contact the Program Director. This contact, like that with the faculty members, normally is informal, and the Program Director may take action he or she deems advisable in attempting to resolve the issue. All parties involved should make every effort to resolve the issue at this point. The Program Director may consult with either the Biotechnology Program Graduate Committee or an ad hoc committee of graduate faculty from the Program (when the appeal is of an action taken by the Graduate Committee or a substantial proportion of its elected members) for advice.
regarding a proposed resolution to the appeal. If the student still is not satisfied following these meetings and discussions, the student may make a formal appeal to the Graduate School of Biomedical Sciences. The appeal shall be processed according to the rules of the Graduate School in effect at the time it is filed.

IV. Research Assistantships and Industry Internships

Students admitted into the Biotechnology program will receive scholarships in the Fall semester. Beginning in the summer term, if a student chooses to stay in a Biotechnology faculty lab, research assistantships will be available (½ paid by GSBS, ½ paid by investigator) through the completion of the program (given that students are in good academic and professional standing).

Students choosing to pursue an industry internship will be responsible for securing the internship. Those students that take the industry route will have their scholarship renewed for the second year (given the student is in good academic and professional standing.) Internships should start in the Summer semester and students are not eligible for fee waivers.

More information on internships is provided on the GSBS Biotechnology website. Students will meet with their Graduate Advisor and Student Affairs Advocate in November of each year before Thanksgiving. A checklist will be started and electives explained and rotations discussed for the spring. Students are expected to join the monthly Biotech Connect zoom meetings, which meet the first Wednesday of the month.
# APPENDIX 1: Biotechnology Student Checklist

## Degree Plan Checklist Worksheet

<table>
<thead>
<tr>
<th>Semester</th>
<th>Courses</th>
<th>Status</th>
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</thead>
<tbody>
<tr>
<td><strong>Fall Year 1</strong></td>
<td><strong>GSBS 5000 Interprofessional Collab Practice</strong></td>
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<tr>
<td></td>
<td><strong>GSBS 5471 Core I: Molecules</strong></td>
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<td><strong>GSBS 5372 Core II: Cells</strong></td>
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<td><strong>GSBS 5373 Core III: Genes</strong></td>
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<td><strong>GSBS 5174 Core IV: Seminar</strong></td>
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<td><strong>GBTC 5020 (2) Biotech Lab Methods</strong></td>
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<td><strong>Spring Year 1</strong></td>
<td><strong>GSBS 5020 Biotech Seminar</strong></td>
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<td><strong>GBTC 6202 Biomedical Informatics</strong></td>
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<td><strong>GBTC 6301 Intro to Biotechnology</strong></td>
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<td><strong>GBTC 5337 Techniques in Biotech</strong></td>
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<td></td>
<td><strong>GSBS 5101 Responsible Conduct of Research</strong></td>
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<td></td>
<td><strong>Elective Choices: Must take an elective Year 1 either Spring or Summer: options listed below</strong></td>
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<tr>
<td><strong>Summer Year 1</strong></td>
<td><strong>Lab Option</strong></td>
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<td></td>
<td><strong>GBTC 7000 (6) Research</strong></td>
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<td></td>
<td><strong>Industry Option</strong></td>
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<td></td>
<td><strong>GBTC 6001 (6) Industry Internship</strong></td>
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<td><strong>Fall Year 2</strong></td>
<td><strong>Lab Option</strong></td>
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<td><strong>GBTC 7000 (9) Research</strong></td>
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<td></td>
<td><strong>GBTC 5199 Biotech Lab Report</strong></td>
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<td></td>
<td><strong>Industry Option</strong></td>
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<tr>
<td></td>
<td><strong>GBTC 6001 (9) Research</strong></td>
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<tr>
<td></td>
<td><strong>GBTC 5298 Biotech Industry Report</strong></td>
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<tr>
<td><strong>Spring Year 2</strong></td>
<td><strong>Lab Option</strong></td>
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<td></td>
<td><strong>GBTC 7000 (9) Research</strong></td>
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<td><strong>GBTC 5299 Biotech Final Report</strong></td>
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<td></td>
<td><strong>Industry Option</strong></td>
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<td></td>
<td><strong>GBTC 6001 (9) Biotech Internship</strong></td>
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<td></td>
<td><strong>GBTC 5299 Biotech Final Report</strong></td>
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<td><strong>Elective Choice: Must take a total of 3 hours of electives to meet program requirements</strong></td>
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<td></td>
<td><strong>GBTC 5210 The Microbiome</strong></td>
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<td><strong>GBTC 5212 Intro to Bacteriology</strong></td>
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<td><strong>GBTC 5213 Intro to Virology/Parasitology</strong></td>
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<td><strong>GBTC 5340 Biology of Cancer</strong></td>
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<td></td>
<td>Other concentration advanced courses: GBCM 6320 Advanced Cell Biology, GBCM 6333 Advanced Protein Biochemistry, GMBP 5302 Human Physiology, GTNP 5303 Principles of Translational Neuroscience and Pharmacology, GMBP 5321 Biochemistry &amp; Biophysics of Membranes</td>
<td></td>
</tr>
<tr>
<td><strong>Institutional Requirements</strong></td>
<td><strong>InterProfessional Education (IPE) Activity</strong></td>
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</tr>
</tbody>
</table>

**Total Hours:**

- **Fall Year 1:** 13 hours
- **Spring Year 1:** 12-14 hours
- **Fall Year 2:** 10-11 hours
- **Spring Year 2:** 11-13 hours

**Total Electives:** 3 hours

**Total Hours (excluding electives):** 48 hours

**Total Activity:** 1
APPENDIX 2: Current Committee Assignments

Biotechnology Graduate Program Committee:

<table>
<thead>
<tr>
<th>ABILENE</th>
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</thead>
<tbody>
<tr>
<td>Sanjay Srivastava, Ph.D.</td>
<td>Abilene Program Director</td>
</tr>
<tr>
<td>Irene La-Beck, Pharm.D.</td>
<td>Graduate Program Advisor – Abilene</td>
</tr>
<tr>
<td>Maciej Markiewski, M.D., Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Amalie Lopez</td>
<td>Student Affairs Advocate – Abilene</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LUBBOCK</th>
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</thead>
<tbody>
<tr>
<td>Ina Urbatsch, Ph.D.</td>
<td>Lubbock Program Director</td>
</tr>
<tr>
<td>Komaraiah Palle, Ph.D.</td>
<td>Graduate Program Advisor – Lubbock</td>
</tr>
<tr>
<td>Michael Blanton, Ph.D.</td>
<td>Ex-Officio</td>
</tr>
<tr>
<td>Ted Reid, Ph.D.</td>
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<td>TBD</td>
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<td>TBD</td>
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<tr>
<td>Leslie Fowler</td>
<td>Student Affairs Advocate – Lubbock</td>
</tr>
</tbody>
</table>

Graduate Council Representatives:

Irene La-Beck – Abilene
Komaraiah Palle – Lubbock
## APPENDIX 3: Graduate Faculty of the Biotechnology Program

<table>
<thead>
<tr>
<th>ABILENE FACULTY</th>
<th>LUBBOCK FACULTY</th>
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</thead>
<tbody>
<tr>
<td>Sanjay Srivastava, Ph.D.</td>
<td>Ina Urbatsch, Ph.D.</td>
</tr>
<tr>
<td>(Abilene Program Director)</td>
<td>(Lubbock Program Director)</td>
</tr>
<tr>
<td>Irene La-Beck, Pharm.D.</td>
<td>Komaraiah Palle, Ph.D.</td>
</tr>
<tr>
<td>(Abilene Graduate Advisor)</td>
<td>(Lubbock Graduate Advisor)</td>
</tr>
<tr>
<td>Magdalena Karbowniczek, MD, Ph.D.</td>
<td>Sharilyn Almodovar, Ph.D.</td>
</tr>
<tr>
<td>Dawn Kochaneck, Ph.D.</td>
<td>Pablo Artigas, Ph.D.</td>
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<tr>
<td>Devin Lowe, Ph.D.</td>
<td>Susan Bergeson, Ph.D.</td>
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<tr>
<td>Maciej Markiewski, MD, Ph.D.</td>
<td>Yangzom Bhutia, Ph.D.</td>
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<tr>
<td>Laurence Wood, Ph.D.</td>
<td>Michael Blanton, Ph.D.</td>
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<tr>
<td></td>
<td>Ion Alexandru Bobulescu, M.D.</td>
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<td></td>
<td>Gail Cornwall, Ph.D.</td>
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<td></td>
<td>Luis Cuello, Ph.D.</td>
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<td>Jannette Dufour, Ph.D.</td>
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<td>Joe Fralick, Ph.D.</td>
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<td></td>
<td>Vadivel Ganapathy, Ph.D.</td>
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<td>Matthew Grisham, Ph.D.</td>
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<td></td>
<td>Petar Grozdanov, Ph.D.</td>
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<tr>
<td></td>
<td>Lan Guan, MD, Ph.D.</td>
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<td></td>
<td>Josee Guindon, Ph.D.</td>
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<td></td>
<td>Abdul Hamood, Ph.D.</td>
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<td></td>
<td>Daniel M. Hardy, Ph.D.</td>
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<td></td>
<td>George Henderson, Ph.D.</td>
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<td></td>
<td>Michaela Jansen, Ph.D.</td>
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<td></td>
<td>Min Kang, Ph.D.</td>
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<td>Andrey Karamyshev, Ph.D.</td>
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<td>Josh Lawrence, Ph.D.</td>
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<td>Hongjun Liang, Ph.D.</td>
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<td>Clinton C. MacDonald, Ph.D.</td>
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<td></td>
<td>Srinivas Nandana, Ph.D.</td>
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<tr>
<td></td>
<td>Madhusauhanan Narasimhan, Ph.D.</td>
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<td></td>
<td>Volker Neugebauer, Ph.D.</td>
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<td></td>
<td>Lindsey Penrose, Ph.D.</td>
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<td></td>
<td>Igor Ponomarev, Ph.D.</td>
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<td></td>
<td>Kevin Pruitt, Ph.D.</td>
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<td>Hemachandra Reddy, Ph.D.</td>
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<td></td>
<td>Ted Reid, Ph.D.</td>
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<td></td>
<td>Patrick Reynolds, MD, Ph.D.</td>
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<td></td>
<td>Kendra Rumbaugh, Ph.D.</td>
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<td></td>
<td>Brandt Schneider, Ph.D.</td>
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<td>Roger Bryan Sutton, Ph.D.</td>
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<td>Jeffrey Thomas, Ph.D.</td>
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<tr>
<td></td>
<td>Manisha Tripathi, Ph.D.</td>
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<td></td>
<td>Simon C. Williams, Ph.D.</td>
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</table>
APPENDIX 4: Evaluation of graduate students during laboratory rotations.

Biotechnology Graduate Program
Rubric for

Student Name: ___________________________ Rotation Date: _______________________

Circle either YES or NO for each question. NO requires an explanation

1. Student understands the rationale of the research focus of the lab.
   YES NO (explanation):

2. Student demonstrates sufficient experimental attention to detail.
   YES NO (explanation):

3. Student learns the principles of methods used for experiments.
   YES NO (explanation):

4. Student learns to interpret data independently and accurately.
   YES NO (explanation):

5. Student demonstrates capacity to plan appropriate experiments.
   YES NO (explanation):

6. Student maintains a legible record of experimental details.
   YES NO (explanation):

7. Student demonstrates progressively increasing independence.
   YES NO (explanation):

8. Student was in the laboratory an average of six hours per week.
   YES NO (explanation):

Final Grade (circle one):

If six or more ‘YES’: A
If three or four ‘NO’: B
If five or more ‘NO’: C

ADDITIONAL COMMENTS: (If additional space is needed continue on the back)

Date evaluation reviewed by Graduate Advisor _______________
APPENDIX 5: Final Report – GBTC 5299

The Biotechnology Student Checklist should be completed and filed in the student's official departmental record following agreement by the student's graduate committee that all necessary "benchwork" has been completed.

Students must submit this form to the graduate program coordinator in April of their final semester as part of the graduate program committee student progress evaluation process.

Date: __________________________

Student: __________________________

List of abstracts, publications, presentations, awards, and/or graduate fellowships:

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

__________  __________  __________
Committee Members In favor Against

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Reviewed by Graduate Advisor: Date: __________________________
APPENDIX 6: Required Courses

**Year 1, Fall Term**

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Name</th>
<th>Credit Hours</th>
</tr>
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<tbody>
<tr>
<td>GSBS 5471</td>
<td>Core I: Molecules</td>
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<td>GSBS 5372</td>
<td>Core II: Cells</td>
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<td>Core III: Genes</td>
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<td>GSBS 5174</td>
<td>Core IV: Biomedical Seminar</td>
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<tr>
<td>GBTC 5020</td>
<td>Laboratory Methods</td>
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**Year 1, Spring Term**

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<tr>
<td>GBTC 6201</td>
<td>Biotechnology Seminar</td>
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<td>GBTC 5337</td>
<td>Techniques in Biotechnology Research</td>
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<td>GBTC 6301</td>
<td>Introduction to Biotechnology</td>
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<td>GBTC 6202</td>
<td>Biomedical Informatics</td>
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<td>GSBS 5101</td>
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**Year 1, Summer Term**

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**Year 2, Fall Term**

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<td>Research Internship</td>
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<td>GBTC 5199 or GBTC 5298</td>
<td>Biotechnology Lab Report Biotechnology Industry Report</td>
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**Year 2, Spring Term**

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<td>GBTC 5299</td>
<td>Biotechnology Final Report</td>
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