Description
The Ph.D. degree in Biomedical Sciences—Cellular and Molecular Biology prepares creative research scientists for careers in teaching, research and biotechnology. Graduates possess an in-depth comprehension of experimental design at the cellular and molecular levels of biological organization as well as competency in current techniques in the discipline. Major research emphases include signal transduction, biochemistry and pathobiology, gene regulation, cell systems biology, cell and tissue ultrastructure, membrane structure and function, molecular aspects of neurobiology and endocrinology, genetics and metabolism of microorganisms, virology and immunology, and enzymology with an emphasis on protein dynamics and folding as well as cytochrome P-450s.

The Biomedical Sciences—Cellular and Molecular Biology major consist of two concentrations:

• Cellular Biology and Structure
• Molecular Biology and Genetics

Program faculty are drawn from several different departments located at Kent State University, the Cleveland Clinic Foundation, the Northeastern Ohio Universities College of Medicine and the University of Akron. Additional participant faculty are located at area clinical facilities and hospitals. This multi-departmental and inter-institutional structure gives doctoral candidates access to the talents of a broadly diverse research faculty as well as significant research facilities and resources.

FULLY OFFERED AT:
• Kent Campus

Admission Requirements
• Master of Science degree
• Official transcript(s)
• 3.0 GPA
• GRE scores
• Goal statement
• Three letters of recommendation

English Language Proficiency Requirements for International Students: All international students must provide proof of English language proficiency (unless they meet specific exceptions) by earning a minimum 600 TOEFL score (100 on the Internet-based version), minimum 85 MELAB score, minimum 7.0 IELTS score or minimum 68 PTE Academic score. For more information on international admission, visit the Office of Global Education’s admission website. Effective spring 2018.

For more information about graduate admissions, please visit the Graduate Studies website.

1 Students without a master’s degree may be permitted direct matriculation to the doctoral program following completion of no less than 20 credit hours of graduate coursework (including the core) and with the recommendation of the student’s guidance committee and the school director. Normally, a student is admitted to the master’s program prior to doctoral work, but a student holding only a baccalaureate may be admitted directly into the doctoral program in exceptional cases.

Program Learning Outcomes
Graduates of this program will be able to:

1. Publish their research in peer-reviewed journals.
2. Demonstrate the ability to teach undergraduate students.
3. Seek employment after graduation in fields that reflect their area of training.

Program Requirements
Major requirements

<table>
<thead>
<tr>
<th>Major Requirements</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>BMS 80199 DISSERTATION I</td>
<td>30</td>
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<tr>
<td>Methodology and Elective Courses (Chemistry, Biological Sciences, Biomedical Sciences)</td>
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Concentrations
Choose from the following:

• Cellular Biology and Structure
• Molecular Biology and Genetics

Minimum Total Credit Hours: 60

Cellular Biology and Structure Concentration Requirements
[PHD-CMBI-CBAS]

<table>
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<tr>
<td>BMS 70220 HUMAN MICROSCOPIC ANATOMY</td>
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<td>BSCI 70142 BIOENERGETICS</td>
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<td>BSCI 70143 EUKARYOTIC CELL BIOLOGY</td>
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Minimum Total Credit Hours: 11

Molecular Biology and Genetics Concentration Requirements
[PHD-CMBI-MBGN]

<table>
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<tr>
<td>BSCI 70143 EUKARYOTIC CELL BIOLOGY</td>
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<tr>
<td>BSCI 70158 MOLECULAR BIOLOGY</td>
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<tr>
<td>CHEM 70253 BIOMACROMOLECULAR STRUCTURES</td>
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<td>&amp; CHEM 70254 BIOMEMBRANES</td>
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Methodology and Elective Courses (Chemistry, Biological Sciences, Biomedical Sciences) 5-8

Minimum Total Credit Hours: 11
Each doctoral candidate, upon admission to candidacy, must register for BMS 80199 for a total of 30 hours. It is expected that a doctoral candidate will continuously register for Dissertation I, and thereafter BMS 80299, each semester, including one term each summer, until all requirements for the degree have been met. As soon after completion of the candidacy examination as possible, the dissertation committee will be established, consisting of the guidance committee and an outside discipline member—a graduate faculty member from another department at Kent State University or another program committee of the School of Biomedical Sciences. The student will submit to this committee her/his prospectus for the dissertation. The format of the prospectus will parallel that utilized for NIH grant proposals (without biographical, budget and facilities information). The dissertation committee may elect to examine the candidate on the proposal, may accept it as submitted, or may reject it with specific reasons and recommendations for reformulation.