Biomedical Science, Ph.D.

Molecular Physiology and Biophysics

The Doctor of Philosophy in biomedical science with a molecular physiology and biophysics subprogram offers opportunities for training and research. The degree requires a minimum of 72 s.h. of graduate credit. Students must maintain a cumulative g.p.a. of at least 3.00 to earn the degree.

Students enter the molecular physiology and biophysics subprogram through the Biomedical Science Program (BSP). The BSP is designed to provide students maximum flexibility during the first year of graduate studies to take a course of study compatible with several programs while completing research rotations. At the end of the first year, students choose a subprogram affiliation.

Students join an active group of faculty members and advanced students at a time of expanding interdisciplinary biomedical research at the University of Iowa. Faculty in the Department of Molecular Physiology and Biophysics have a strong research focus on the cellular, molecular, and physical mechanisms of physiological processes.

The Ph.D. in biomedical science with a molecular physiology and biophysics subprogram requires the following coursework.

**Typical Curriculum**

**First Year, Fall**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMED:5207</td>
<td>Principles of Molecular and Cellular Biology</td>
<td>3</td>
</tr>
<tr>
<td>BMED:5208</td>
<td>Topics in Principles of Molecular and Cellular Biology</td>
<td>1</td>
</tr>
<tr>
<td>BMED:7777</td>
<td>Biomedical Science Seminar</td>
<td>1</td>
</tr>
<tr>
<td>PCOL:5204</td>
<td>Basic Biostatistics and Experimental Design</td>
<td>arr.</td>
</tr>
<tr>
<td>Elective course(s)</td>
<td></td>
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**First Year, Spring**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMED:7777</td>
<td>Biomedical Science Seminar</td>
<td>1</td>
</tr>
<tr>
<td>BMED:7888</td>
<td>Biomedical Science Research</td>
<td>arr.</td>
</tr>
<tr>
<td>MMED:6260</td>
<td>Methods for Molecular and Translational Medicine</td>
<td>1</td>
</tr>
<tr>
<td>PATH:5270/ IGPI:5270/ MMED:5270</td>
<td>Pathogenesis of Major Human Diseases</td>
<td>3</td>
</tr>
<tr>
<td>Elective course(s)</td>
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<td></td>
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**Second Year, Fall**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMED:5207</td>
<td>Principles of Molecular and Cellular Biology</td>
<td>3</td>
</tr>
<tr>
<td>BMED:7270</td>
<td>Scholarly Integrity/ Responsible Conduct of Research I</td>
<td>0</td>
</tr>
<tr>
<td>MPB:5153</td>
<td>Graduate Physiology</td>
<td>4</td>
</tr>
<tr>
<td>MPB:6302</td>
<td>Research Physiology and Biophysics</td>
<td>6</td>
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</table>

**Second Year, Spring**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMED:7271</td>
<td>Scholarly Integrity/ Responsible Conduct of Research II</td>
<td>0</td>
</tr>
<tr>
<td>MPB:6225/ ACB:6225/ MMED:6225/ PCOL:6225</td>
<td>Growth Factor Receptor Signaling (elective)</td>
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</tr>
<tr>
<td>MPB:6302</td>
<td>Research Physiology and Biophysics</td>
<td>2</td>
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<tr>
<td>MMED:6215</td>
<td>Transcription and Multifunctional Regulation by RNA (elective)</td>
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</tr>
<tr>
<td>MMED:6226/ ACB:6226/ MPB:6226</td>
<td>Cell Cycle Control (elective)</td>
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</tr>
<tr>
<td>MMED:6227/ ACB:6227/ MPB:6227</td>
<td>Cell Fate Decisions (elective)</td>
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</table>

**Elective Coursework Options**

Any elective preapproved by the director of graduate studies can be used to meet the elective requirement. A total of 9 s.h. of elective coursework is required.

The most common elective options are the following.

<table>
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<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPB:6220/ ACB:6220/ MMED:6220</td>
<td>Mechanisms of Cellular Organization</td>
<td>3</td>
</tr>
<tr>
<td>GENE:6150</td>
<td>Genetic Analysis of Biological Systems</td>
<td>3</td>
</tr>
<tr>
<td>IGPI:5270/ MMED:5270/ PATH:5270</td>
<td>Pathogenesis of Major Human Diseases</td>
<td>3</td>
</tr>
<tr>
<td>NSCI:5653/ BIOL:5653/ PSY:5203</td>
<td>Fundamental Neurobiology I</td>
<td>3</td>
</tr>
</tbody>
</table>

**Additional Requirements**

**Plan of Study**

In consultation with the director of graduate studies, each newly admitted student formulates a plan of study to be completed before the comprehensive examination. This plan should include projected dates for completion of the comprehensive examination as well as provision for removal of deficiencies. Before completing the comprehensive exams, the normal course load is 15 s.h. each semester.

**Required Courses**

It is the intention of the department to have a curriculum that allows coursework to be mostly completed within the first year, though in some instances additional coursework in subsequent years is required. The core curriculum represents...
a minimum of required classes; although with advice of the
director of graduate studies and thesis advisor, some students
may benefit from completing additional coursework.
Requests for waiver of required courses or change of course
registration must be approved by the director of graduate
studies after consultation with the faculty and the chair of the
department.

**Evaluation of Progress**

Students must meet progress requirements of the Department
of Molecular Physiology and Biophysics and the Graduate
College. To meet departmental requirements, students must
earn a grade of B or higher in MPB:5153 Graduate Physiology
and BMED:5207 Principles of Molecular and Cellular Biology
(B-minus or lower constitutes a non-passing grade), a grade of
satisfactory (S) for BMED:7270 Scholarly Integrity/Responsible
Conduct of Research I, and a g.p.a. of at least 3.00 in all
elective coursework (a grade below B, but above D-minus, is
permissible for individual electives, so long as the grade-point
average of all combined electives taken during the graduate
program remains higher than 3.00).

All core curriculum courses receiving a letter grade must be
satisfactorily completed prior to taking the comprehensive
exam. According to Graduate College regulations, students
cannot take a comprehensive exam in a semester in which
they are on academic probation.

**Comprehensive Examination**

Students admitted directly to the doctoral program are
required to complete the comprehensive examination by June
30 of the second year in the program.

**Workshop**

All postcomprehensive students are required to present a
workshop on the progress of their thesis research once per
year. Students should consult with the workshop coordinator
to arrange presentation dates. Precomprehensive students
also are encouraged to present workshops, though it is not
required. Students have an option to present a full or half
workshop (typically 45 or 20 minutes, respectively).

**Teaching**

Experience in teaching is an important part of a student’s
academic training. To attain adequate teaching proficiency,
students receive teaching assignments after successful
completion of the comprehensive exam and in subsequent
years as warranted. Individual assignments depend on the
teaching needs of the department. Examples of teaching
assignments include running review sessions in a graduate
physiology course, formal lectures, participating in small
group conferences, assisting in computer simulations, or
bench mentoring of summer students. These teaching
assignments are made by the director of graduate studies in
consultation with appropriate course directors. Thesis advisors
with specific suggestions concerning teaching assignments
that would be particularly beneficial to the individual
circumstances of a particular student are encouraged to share
them with the director of graduate studies for consideration.
However, final discretion for approval lies with the director of
graduate studies who must preapprove all assignments.

**Research Publication**

It is expected that thesis research will result in findings
that are of sufficient quality and completeness to warrant
publication in good quality peer-reviewed journals. At least
one first-author peer-reviewed research paper should be
accepted for publication prior to the Ph.D. thesis defense.
The published paper or a letter from an editor indicating
acceptance should be provided to the director of graduate
studies before scheduling a final exam date. In certain cases,
a first-author research manuscript might be written, but not
yet accepted by a journal at the time a final Ph.D. thesis exam
is scheduled. In this case, the first-author requirement may
be satisfied if trainees submit their manuscript to the preprint
server for biology, bioRxiv.

**Thesis Defense and Presentation**

Students complete a thesis defense with their committee.
Once this test is completed they must schedule a public thesis
presentation.

**Combined Programs**

**Ph.D./M.D.**

Students may work toward the Doctor of Medicine degree
and a Ph.D. in biomedical science (molecular physiology
and biophysics subprogram) in a combined degree program
offered by the Graduate College and the Carver College of
Medicine. Applicants must be admitted to both programs
before they may be admitted to the combined degree
program. See the Medical Scientist Training Program (Carver
College of Medicine) in the Catalog.