The requirements for the Ph.D. degree are as follows:

1. Training in biology equivalent to that of an undergraduate biology major at Stanford.
2. Completion of the following courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
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<tbody>
<tr>
<td>BIOS 200</td>
<td>The Nucleus (For classes entering in 2012 or later. Students who entered in 2011 or earlier took GENE 203, Advanced Genetics.)</td>
<td>8</td>
</tr>
<tr>
<td>CBIO 241</td>
<td>Molecular, Cellular, and Genetic Basis of Cancer (Offered in Winter Quarter)</td>
<td>5</td>
</tr>
<tr>
<td>BIO 214</td>
<td>Advanced Cell Biology</td>
<td>4</td>
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</tbody>
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Select one of the following:

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<tr>
<th>Course Code</th>
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<tr>
<td>BIOMEDIN 214</td>
<td>Representations and Algorithms for Computational Molecular Biology</td>
</tr>
<tr>
<td>BIOMEDIN 217</td>
<td>Translational Bioinformatics</td>
</tr>
<tr>
<td>CBIO 243</td>
<td>Principles of Cancer Systems Biology</td>
</tr>
<tr>
<td>CBIO 245</td>
<td>Introduction to Biomedical Informatics Research Methodology</td>
</tr>
<tr>
<td>CBIO 280</td>
<td>Cancer Biology Journal Club (required for first- and second-year graduate students in Autumn, Winter, and Spring quarters, totaling 6 units)</td>
</tr>
<tr>
<td>MED 255</td>
<td>The Responsible Conduct of Research</td>
</tr>
</tbody>
</table>

3. At least 6 units of additional cancer biology-related, graduate-level courses. Course work taken is determined in consultation with the student’s adviser and/or the Program Director.
4. Presentation of research results at the annual Cancer Biology Conference on at least three occasions, at least one being an oral presentation.
5. Completion of a qualifying examination in Cancer Biology is required for admission to Ph.D. candidacy. The exam consists of an NIH-style written grant proposal not to exceed ten pages (excluding references) and an oral examination. The examining committee consists of three faculty members from the Cancer Biology Program and does not include the student’s dissertation adviser. The composition of this committee is chosen by the student and dissertation adviser and must be submitted to and approved by the program director prior to the end of Autumn Quarter, second year. The qualifying examination must be taken prior to the end of Spring Quarter, second year. If necessary, one retake is permitted prior to the end of Summer Quarter, second year. After the qualifying examination has been completed, the student is required to form a dissertation reading committee that includes the student’s adviser and three other members of the Academic Council with appropriate expertise. Each student is required to arrange annual meetings (more frequently, if necessary) of the dissertation reading committee, at which time progress during the past year and a plan of study for the coming year are presented orally and discussed. Completion of each annual committee meeting must be communicated in writing to the program director by the adviser by the end of Spring Quarter each year.

The major accomplishment of each successful Ph.D. student is the presentation of a written dissertation resulting from independent investigation that contributes to knowledge in the area of cancer biology. An oral examination is also required for the Ph.D. degree. In the Cancer Biology Program, a public seminar (one hour) is presented by the Ph.D. candidate, followed by a closed-door oral examination. The oral examination committee consists of at least four examiners (the members of the doctoral dissertation reading committee) and a chair. The oral exam
examination chair must be from outside the Cancer Biology Program faculty and may not have a full or joint appointment in the adviser’s or student’s home department. However, a courtesy appointment does not affect eligibility. The oral examination chair may be from the same department as any other member(s) of the examination committee. All members of the oral examination committee are normally members of the Academic Council, as the oral examination chair must be. With the prior approval of the program director or school dean, one of the examiners may be a person who is not a member of the Academic Council if that individual contributes expertise not otherwise available. Official responsibility for selecting the oral examination chair rests with the program. Cancer Biology delegates this to the student and dissertation adviser.

Program Director: Amato Giaccia (Radiation Oncology)
Committee on Cancer Biology: Steven Artandi (Medicine, Hematology), Jeffrey Axellod (Pathology), Katrin Chua (Medicine, Endocrinology), Max Diehn (Radiation Oncology), Edward Graves (Radiation Oncology), Ashby Morrison (Biology), Sylvia Plevritis (Radiology), Jonathan Pollack (Pathology), Alejandro Sweet-Cordero (Pediatrics), Monte Winslow (Genetics)

Participating Departments and Faculty
Biochemistry: Philip Beachy (Professor), Patrick O. Brown (Professor)
Bioengineering: Jennifer Cochran (Assistant Professor)
Biology (School of Humanities and Sciences): Martha Cyert (Professor), Judith Frydman (Professor), Ozgani (Associate Professor), Ashby Morrison (Assistant Professor), W. James Nelson (Professor), Tim Stearns (Professor), Virginia Walbot (Professor)
Chemical And Systems Biology: James K. Chen (Associate Professor), Karlene Cimprich (Associate Professor), James E. Ferrell (Professor), Tobias Meyer (Professor), Daria Mochly-Rosen (Professor), Mary Teruel (Assistant Professor)
Dermatology: Howard Y. Chang (Professor), Paul A. Khavari (Professor), M. Peter Marinkovich (Associate Professor), Anthony Oro (Professor)
Developmental Biology: Margaret Fuller (Professor), Seung Kim (Professor), Stuart Kim (Professor), Roeland Nusse (Professor), Matthew Scott (Professor), Lucy Shapiro (Professor)
Genetics: Anne Brunet (Associate Professor), Michele Calos (Professor), Stanley Cohen (Professor), Monte W. Winslow (Assistant Professor)
Medicine/Blood and Marrow Transplantation: Robert Negrin (Professor)
Medicine/Cardiovascular Medicine: Ching-Pin Chang (Associate Professor)
Medicine/Endocrinology/Gerontology/Metabolism: Katrin Chua (Assistant Professor), Andrew R. Hoffman (Professor)
Medicine/Gastroenterology and Hepatology: Christine Cartwright (Professor), Anson Lowe (Associate Professor)
Medicine/Hematology: Steven Artandi (Professor), Linda Boxer (Professor), Calvin Kuo (Professor), Ravindra Majeti (Assistant Professor)
Medicine/Oncology: Ash Alizadeh (Assistant Professor), Gilbert Chu (Professor), Michael Clarke (Professor), Dean Felscher (Associate Professor), James Ford (Associate Professor), Ronald Levy (Professor), Shoshana Levy (Professor, Research), Beverly S. Mitchell (Professor, Research), Director, Stanford Cancer Institute), Rajat Rohatgi (Assistant Professor), Branimir Sikic (Professor)
Medicine/Pulmonary and Critical Care Medicine: Glenn Rosen (Associate Professor)
Microbiology and Immunology: Helen M. Blau (Professor), Garry Nolan (Professor)
Neurology and Neurological Sciences: Thomas Rando (Professor)
Neurology and Neurosurgery: Yoon-Jae Cho (Associate Professor)
Neurosurgery: Albert J. Wong (Professor)
Obstetrics and Gynecology: Renee A. Reijo Pera (Professor)
Orthopaedic Surgery: Nidhi Bhutani (Assistant Professor)
Otolaryngology: John Sunwoo (Assistant Professor)
Pathology: Jeff Axellod (Associate Professor), Matthew Bogyo (Associate Professor), Michael Cleary (Professor), Gerald Crabtree (Professor), Edgar Engleman (Professor), Andrew Fire (Professor), Isabella Graef (Assistant Professor), Joseph Lipnick (Professor), Bingwei Lu (Associate Professor), Jonathan Pollack (Associate Professor), Arend Sidow (Associate Professor), Irving Weissman (Professor; Virginia & D.K. Ludwig Professor for Clinical Investigation in Cancer Research, Professor of Developmental Biology), Marius Wernig (Assistant Professor)
Pediatrics/Cancer Biology: Matthew Porteus (Associate Professor), Julian Sage (Associate Professor), Alejandro Sweet-Cordero (Assistant Professor)
Pediatrics/Cardiology: Marlene Rabinovitch (Professor)
Pediatrics/Endocrinology: Brian Feldman (Assistant Professor)
Pediatrics/Hematology/Oncology: Kathleen Sakamoto (Professor)
Pediatrics/Neonatal & Developmental Medicine: Christopher Contag (Professor)
Radiation Oncology/Radiation Biology: Laura Attardi (Associate Professor), J. Martin Brown (Professor), Amato Giaccia (Professor; Director, Stanford University Cancer Biology Program)
Radiation Oncology/Radiation Physics: Edward Graves (Associate Professor)
Radiation Oncology/Radiation Therapy: Max Diehn (Assistant Professor), Susan Knox (Associate Professor), Albert Koong (Associate Professor), Quynh-Thu Le (Professor)
Radiology/Diagnostic Radiology: Sylvia Plevritis (Associate Professor), Jianguo Ruo (Associate Professor)
Structural Biology: William Weis (Professor)
Urology: Donna Peehl (Professor, Research), Zijie Sun (Associate Professor)