Course ID: BIO 103
Instructor: Michael H. Bachmann, M.D., Sc.D.
Dates: 10 sessions, Sept. 26 - Dec. 12, 2016
Time: Mondays, 7:00-8:50 p.m.
Location: TBD
Documentary film series: Thursdays of each week, 7:00-8:50 p.m. (optional attendance)
Course Website: http://tinyurl.com/SU-CS-BIO103

Overview:
This course is designed to give students a fundamental knowledge of cancer biology, its essential concepts, and the most common disease examples. Furthermore, the course covers mechanisms of carcinogenesis, cancer genes and signaling pathways, tumor microenvironment and metastasis, tumor immunology, diagnostics, prevention, and cancer therapies.

Prerequisites:
This course is intended for people with little to no knowledge of cancer biology. A basic understanding of molecular and cellular biology is recommended, i.e. one year of college level general biology, AND the desire to learn about science! For those with a minimal biology background, additional background material can be provided, however, more intensive home study will be needed to keep up with the class. Biomedical, biotechnology and other professionals who want to expand their biomedical knowledge are welcome and can take advantage of advanced learner's options through further science readings and course materials provided upon request.

Grade Options and Requirements:
No Grade Requested (NGR): Just show up for class.

Credit: Students give a 10-15 min. presentation at the end of the course on a cancer-related topic of their interest. This can be in the form of a slide presentation, the reading of a piece of composed literature, or any type of multi-media presentation.

Letter Grade: Students must complete the requirements for credit (see above) AND pass a take-home exam. This will be handed out in Week 4 and is due in Week 9 of the course, however, an extension of the deadline may be offered under special circumstances of need. This take-home exam will be treated confidentially and all copies or records of it will be destroyed or deleted at the conclusion of the course.

Expected Learning Outcomes: By the end of this course, participants will have attained a working knowledge of the principles of cancer biology and understand the complexities of diagnosis, medical treatment and prevention of cancer. Selected major topics will include: control of growth in normal and cancer cells, the genetic basis of cancer (oncogenes and tumor suppressor genes), dysregulation of cellular signaling pathways, cell cycle regulation and apoptosis, immortality and failure of genome maintenance, tumor initiation and progression, carcinogens (physical, chemical, and microbiological) and their mechanisms of action, tumor immunology, cancer prevention, diagnostics, and cancer treatment strategies. Novel diagnostics and experimental treatments will also be discussed.

Attendance: Showing up is the first secret to success. If for whatever reason you need to miss a class, you can catch up by reviewing the lecture slides together with lecture notes from your classmates.
**Instructional method:** Each class features a slide lecture that covers highlights of the required and recommended reading as well as additional materials, followed by a question and answer session. Questions are highly encouraged, as is preparation of each class according to the class syllabus. The slides for each lecture will be available for download from the CSP Moodle site.

**Keys to success:**

* Cancer biology and oncology are vast fields of knowledge that no single individual has complete mastery of. However, despite the seemingly daunting prospect of learning its fundamental principles and facts, a holistic understanding ("Gestalt") of this disease will emerge in your mind over the time of this course that will enable you to dig deeper into questions of interest on your own and in collaboration with experts.

* For letter grade prepare by reading the chapters in the Weinberg book prior to each class so that we can together deepen your understanding and, if possible, clarify areas of uncertainty. Try not to fall behind schedule since catching up will require doubled efforts – which is hard to do when you have an already busy work schedule.

* Input = output: The more you participate in question and answer sessions, and in group discussions, the more you will get out of the class.

* Form a study or discussion group, and find approachable people at Stanford who are knowledgeable about a topic of your interest and who are willing to help you with your next learning steps.

**Textbooks:**

**Required**

1. Title: Anti-cancer: A New Way of Life  
   Author: David Servan-Schreiber  

2. Title: Living Downstream: An Ecologist's Personal Investigation of Cancer and the Environment  
   Author: Sandra Steingraber  

**Highly Recommended:**

1. Title: The Biology of Cancer  
   Author: Robert A. Weinberg  

2. Title: Cancer: 101 Solutions to a Preventable Epidemic  
   Author: Liz Armstrong and Guy Dauncey  

3. Title: The Emperor of Maladies  
   Author: Siddharta Mukherjee  

**Pre-class assignment:**

Required: Read Chapters 1 & 2 of “Anti-Cancer” (Servan-Schreiber) and Chapters 1 & 2 of “Living Downstream” (Steingraber)

Recommended: Read Chapters 1 & 2 of “Biology of Cancer” (Weinberg)

**Documentary series (optional):**

In addition to the Monday class, there will be a series of documentary films offered on subsequent Thursday evenings from 7-9 pm. The location will be the same. The film schedule is available from the course website.
## Course and Reading Schedule:

<table>
<thead>
<tr>
<th>Date</th>
<th>Lecture Topic</th>
<th>&quot;Anti-cancer&quot; by D. Servan-Schreiber</th>
<th>&quot;Living Downstream&quot; by S. Steingraber</th>
<th>&quot;Biology of Cancer&quot; by R.A. Weinberg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1 9/26</td>
<td>Course Overview History and Epidemiology The Nature of Cancer</td>
<td>1, 2</td>
<td>1, 2</td>
<td>Chapters 1, 2</td>
</tr>
<tr>
<td>Week 2 10/3</td>
<td>Tumor Viruses Cellular Oncogenes</td>
<td>3, 4</td>
<td>3, 4</td>
<td>Chapters 3, 4</td>
</tr>
<tr>
<td>Week 3 10/17</td>
<td>Growth Factors and their Receptors Cytoplasmic Signaling Circuitry</td>
<td>5</td>
<td>5</td>
<td>Chapters 5, 6</td>
</tr>
<tr>
<td>Week 4 10/24</td>
<td>Tumor Suppressor Genes pRb and Cell Cycle Clock Take-Home Exam: Start</td>
<td>6</td>
<td>6</td>
<td>Chapters 7, 8</td>
</tr>
<tr>
<td>Week 5 10/31</td>
<td>p53 and Apoptosis Immortalization</td>
<td>7</td>
<td>7</td>
<td>Chapters 9, 10</td>
</tr>
<tr>
<td>Week 6 11/7</td>
<td>Multi-step Tumorigenesis Maintenance of Genome Integrity</td>
<td>8</td>
<td>8</td>
<td>Chapters 11, 12</td>
</tr>
<tr>
<td>Week 7 11/14</td>
<td>Tumor Microenvironment, Heterotypic Interactions, Angiogenesis Invasion and Metastasis</td>
<td>9</td>
<td>9</td>
<td>Chapters 13, 14</td>
</tr>
<tr>
<td>Week 8 11/28</td>
<td>Tumor Immunology Detection, Screening, and Diagnostics</td>
<td>10</td>
<td>10</td>
<td>Chapter 15</td>
</tr>
<tr>
<td>Week 9 12/5</td>
<td>Therapeutics: Surgery, Chemotherapy, Radiation, Immunotherapy, and Complementary Medicine Take-Home Exam: Submit</td>
<td>11, 12</td>
<td>11</td>
<td>Chapter 16</td>
</tr>
<tr>
<td>Week 10 12/12</td>
<td>Cancer Prevention Student Presentations Wrap-up Discussion</td>
<td>13</td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>