Course Syllabus
Bio471: Topics in Cancer Biology Summer 2019

Lecture: Monday 6.30PM- 9.15 PM.
Instructor: Dinesh Thotala, Email: dthotala@wustl.edu Ph: 314-280-6267
Location: TBD

Course Description

Over two-thirds of all people know someone who has cancer. This course aims at providing students with a more extensive understanding of what cancer is and how it affects the human body. This course will teach you to be conversant on issues related to cancer, including its etiology, development, genetics, treatments, and prevention. The course will use a combination of lectures, assignments and presentations to keep up with the basics and new research on cancer. Students are encouraged to participate in class discussions and contribute relevant thoughts and ideas. The course will cover the basics of cancer biology using a traditional lecture including a review of relevant primary literature. The online portion of the course will be the assignment, which have multiple choice and short assays questions. The assignment will include the questions from the lecture and discussions of current topics as primary research articles. See below for the list of lecture topics and summary of the schedule.

Course Objectives

- Be well versed with the fundamentals of cancer biology and how it affects the humans.
- Discuss past and current molecular research in cancer.
- Examine the novel cancer therapies being developed by Academia and pharmaceutical companies.

Suggested course material and reading

- The Biology of Cancer, 2nd Edition Robert A Weinberg
- The Emperor of All Maladies: A Biography of Cancer by Siddhartha Mukherjee (2010)
- The Genetic Basis of Human Cancer by Bert Vogelstein and Kenneth W. Kinzler
- Hallmarks of Cancer: Weinberg and Hannahan

Schedule

Week 1
Lecture 1: History and Profile of a cancer cell
   Introduction and overview of the course
   A brief history of cancer
   Recent trends in cancer rates
   Hallmarks of Cancer: then & now
   Major known causes/risk factors
   Terminologies

Week 2
Lecture 2: Cell Cycle, DNA damage and Cell death
   Carcinogens: Chemical, Radiation and Viruses
   DNA damage: Mutations and Repair
   Cell Cycle: Various stages of cell cycle, Cyclins and Cdk's
   Cell Death: Various forms of cell death.

Week 3
Lecture 3: Mutagens and carcinogenesis
   What cancer at a molecular level?
   How can an infection or chemical cause cancer?
   Why do carcinogens cause specific cancers, or cancer in specific organs?
   Looking at carcinogens we commonly encounter
   Historical perspectives...

Week 4
Lecture 4: Angiogenesis and Metastasis
   Hallmarks of Cancer
   Angiogenesis
   Hypoxia and Metastasis
   EMT and Metastasis

Week 5
Lecture 5: Cancer Genetics
   Genetics – the basics
   Twin studies
   Risk prediction tools
   Cancer syndromes
   What pathways are common secondary mutations?
   How are these pathways connected?
   What drugs are designed to target these pathways?
   Genomics,
   TCGA (The cancer genome atlas)

Week 6
Lecture 6: Screening, Diagnosis, and Therapy
   Cancer Statistics
   Early Detection Screening and Therapy
   Targeted Therapies, Staging
   Cancer Types
   Histological Analysis and Pathological Reports
   Immunotherapy, CAR-T cells therapy
Week 7
Lecture 7: Biomarkers and Personalized medicine and Cancer Imaging

Biomarkers
Personalized medicine,
Cancer Imaging
Ultrasound, PET, SPECT, Optical imaging, MRI,
Focused ultrasound

Week 8
Final Exam

Schedule Summary

<table>
<thead>
<tr>
<th>Week</th>
<th>Monday – Lecture</th>
<th>Wednesday-Assignments (10 points each; total of 60 points)</th>
<th>Monday Presentation (20 points)</th>
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<tr>
<td>Week 1</td>
<td>History and Profile of a cancer cell</td>
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<tr>
<td>Week 2</td>
<td>Cell Cycle, DNA damage and cell death</td>
<td>1st Assignment due</td>
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<tr>
<td>Week 3</td>
<td>Mutagens and carcinogenesis</td>
<td>2nd Assignment due</td>
<td>Presentation 1: Diet Environment and Cancer</td>
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<td>Week 4</td>
<td>Angiogenesis and Metastasis</td>
<td>3rd Assignment due</td>
<td>Presentation 2: Microbiome and Cancer</td>
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<td>Week 5</td>
<td>Cancer Genetics</td>
<td>4th Assignment due</td>
<td>Presentation 3: Biomarkers</td>
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<td>Week 6</td>
<td>Screening, Diagnosis, and Therapy</td>
<td>5th Assignment due</td>
<td>Presentation 4 Immunotherapy and CAR-T cells</td>
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<td>Week 7</td>
<td>Biomarkers and Personalized medicine and Cancer Imaging</td>
<td>6th Assignment due</td>
<td>Presentation 5 Molecular Imaging</td>
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<td>Week 8</td>
<td>FINAL EXAM (20 points)</td>
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Attendance Policy

- Students are expected to attend all classes.
- Please let me know if you will be absent, so the absence can be excused.
- If an exam for another class is scheduled on the same date and time as a lecture, you will not be counted absent if you miss the lecture for that night.
- Withdrawal from the course will be transacted only through student initiation. To withdraw from a course, you must do this online or in person at the desk in January Hall, Room 20. If the student stops coming to lecture it does not withdraw, I still have to assign a grade based on the work you’ve completed.

Expectations and Grading

- Assessment of student performance will be based on the following:
  - Assignments 60%
Presentations  20%
Exam    20%

• **Assignments (60 Points):** There will be six assignments each valid at 10 points. The assignments, which are your online portion, will be an extension of the Monday lectures and they will be posted on Blackboard. Feel free to consult your notes or any online references to answer the questions.
• **Presentation (20 points):** You will be having one presentation, which will be on a recent topic. This presentation will account for 20%
• **Final Exam (20 Points):** The exam will consist of short answer, multiple choice, and fill-in-the-blank style questions taken directly from lectures and your homework assignments. So, be sure to use your homework as your study guides.

The total expected grade conversion (subject to change):

< 60%: Fail/Incomplete
60.1 – 63.3%: D-
63.4 – 66.6%: D
66.7 – 70%: D+
70.1 – 73.3%: C-
73.4 – 76.6%: C
76.7 – 80%: C+
80.1 – 83.3%: B-
83.4 – 86.6%: B
86.7 – 90%: B+
90.1 – 93.3%: A-
93.4 – 96.6%: A
96.7 – 100%: A+

**Missed Exams or Assignments**

• Life happens and sometimes it happens at the most inconvenient times, such as when you are scheduled to take an exam. If you must miss a scheduled examination or assignment for a legitimate reason, students must contact the instructor ahead of time by phone, email, or in person to schedule a make-up.
• If students are taking classes that have scheduled exams which conflict with lecture or exam dates, the students must present syllabi from these classes to the course instructor no later than the second week of class. Alternative exam times will then be arranged as necessary. Alternative times to turn in class assignments will also be arranged as necessary.

**Disabilities**

• Any student with a documented disability who needs special testing arrangements, note taking or other accommodations should contact the Disability Resources center at the Center for Advanced Learning (Cornerstone) on campus.
• For further information, contact Cornerstone at (314) 935-5970, or visit the website http://cornerstone.wustl.edu/ All discussions will remain confidential. No information will be shared without permission.
• Although I am eager to assist you, no accommodation can be made without notification from this office.