TOPICS IN BIOTECHNOLOGY (BIOL 47140/79073)
"FROM THE BENCH TO THE CLINIC"

LEARNING OUTCOME:

Students will learn recently discovered therapeutic strategies for different diseases. The overall goal of the course is to gain a current understanding of research strategies that target disease specific mechanisms for therapeutic intervention.

GENERAL COURSE OUTLINE

1- **Student presentations**:
Each student will choose a different disease for their presentation. The presentation will be prepared in PowerPoint and comprises data from a **CURRENT research paper on their disease that shows a potential strategy for therapeutic intervention.** Your presentation will also be based on a review paper that provides background information on the disease. Your disease/mechanism can be picked from but is not limited to the list given below.

- Each presentation will include an overview of a disease and current treatments using information from a recent review article. You will then focus on a recently discovered strategy that may serve as a treatment for the disease using data from a specific research paper. You should show how the experimental data obtained in each figure provides evidence to support the significance of the findings for preventing or attenuating disease progression.

- **2- Students will provide PDF copies of the review and research paper by email at least one week in advance of submitting their presentation: ALL STUDENTS MUST READ THESE PAPERS in preparation for the student presentations.** We will keep the same class schedule for submitting the presentations. These students must send their papers to the class (and me) by the weekend. They will prepare power point presentations for their topic and send them to the entire class by Thursday morning of their assigned week **in a pdf format**. **There are 2 presenters per week.**

- The **PowerPoint presentations** should use the following format:
  All presentations should include an **introduction** and a **conclusion as statements in bullet form** that highlight the important aspects of the work.
  Each of the data slides has a header that states what the findings show. For example, data showing that the effects of a potential cancer drug on the growth of breast cancer cells could read as follows "Compound X suppresses the proliferation of breast cancer cells". At the bottom of the slide should be a brief presentation of what the data represent. For example, if they are graphs, state what procedure was used and what the measurements represent according to the x and y axis of the graphs.

- **3. Critiques**
  For each presentation, all students are to **submit a one page critique** of each research topic presented each week. Those students who are presenting that week will only prepare a critique for the other student presenting. The critiques

are to be sent to me by the following Thursday morning following each presentation.

Critique Content
The critique should address:
A - The significance of the research for that disease and its therapeutic potential.
B - Would the approach overcome previous obstacles in treating the disease?
C- Did the data support the conclusions given by the authors? If so,why?
D - Are there limitations to the data presented? If so, state what is needed.

4. Written Paper on Topic

Students will also be required to **submit a paper** on the topic that they present.
The **paper** should be a doubled spaced 10 page report (not including references) that covers the topic according to the following format:

(A) Background information on the disease with its molecular mechanism and the need for therapeutic intervention. This section should describe a current overview of the basic scientific research on the mechanism of action of the disease.
(B) Current therapeutic strategies and the need for further research- This section should address current treatments and their efficacy and limitations.
(C) Publication on a disease mechanism that provides evidence for a strategy of therapeutics intervention- This section should address data from a current research paper on a given disease mechanism and it potential as a target of therapeutic intervention.
(D) Conclusions and Relevance-This section should highlight the information given in **A**, **B**, and **C** and a brief description of the impact of the strategy in treating the disease.

4- **Students grades** will be a composite of their paper, presentation and class participation.
Your grade will be based on:

- **40%; Class presentation**
- **30%; Written paper on presentation**
- **30%; Critiques**

SELECTED TOPICS FOR PAPERS

This list represents examples of suitable topics for your paper. You can pick and choose the different categories accordingly, for example, tyrosine kinase receptors as a therapeutic targets in cancer, vaccines in the prevention of HIV, stem cells to treat Parkinson's disease, etc.

DISEASES AND PATHOLOGICAL DISORDERS AS CANDIDATES FOR THERAPEUTIC INTERVENTION

- Viral infections e.g., HIV or HPV or COVID-19
- Diabetes
- Pathogenic microbes & gut microflora
- Specific types of Cancer
- Autoimmune diseases e.g., asthma, muscular dystrophy, rheumatoid arthritis, and lupus

- Neurodegeneration e.g., Alzheimer’s and Parkinson’s disease, epilepsy
- Vascular Biology e.g., Arteriosclerosis, Heart disease, Stroke
- Hematopoietic Diseases: leukemia, sickle cell anemia, Hodgkin’s disease

STRATEGIES USED FOR THERAPEUTIC INTERVENTION

- Monoclonal antibodies as drugs
- Selective inhibitors of protein function in disease e.g., cancer
- Immunotherapy in cancer
- Gene silencing by micro RNA
- Gene therapy by CRISPR
- Stem cell research for cancer or neurodegenerative diseases