Chemistry 743: Drug Discovery/Lead Optimization & DNA as Drug Targets Fall 2018
3 Credits hrs.

Time & Location: Fr 9:30 pm-12:00 pm, Room CHM 170; Official start date: Friday, Sep. 04, 2018; ***Attendance is required***.

Instructor: Dr. Xiaohua Peng, CHM 641, 229-5221, pengx@uwm.edu

Office Hours: By appointment. Speak to me after lecture, or contact me by email to schedule an appointment. If you use email, make sure you use "Chem 743" as the subject line of the email message, or I may not respond in time.

Course Description:
This course provides an understanding of current drug targets and the design and development of drug candidates to cure diseases based on the modulation of these targets. Topics will include selected chapters in Graham L. Patrick textbook, and additional examples and applications will be drawn from the published literature. Selected case histories throughout the course will serve to illustrate the concepts. In class we will discuss structure-activity relationship, drugs that target nucleic acids, and different groups of antibacterial agents, antiviral and anticancer agents. Furthermore, we will discuss aspects of drug design and combinatorial and parallel synthesis in medicinal chemistry objects. Selected readings and problems will be assigned, both from the text and from the primary literature as handouts.

Course Load:
The student is required to attend class 743 scheduled for 150 minutes per week and urged to spend at least the double amount of time to read the textbook and other source indicated.

Textbook:
Required books:
(**GP**) An introduction to medicinal chemistry: Graham Patrick, Oxford Press. , ISBN 0199234477
(**GT**) Medicinal chemistry, an introduction: Gareth Thomas, Wiley, ISBN 0470025980

Optional:
Practice of medical chemistry: Camille George Wermuth, Academic Press. ISBN 0127444815
Foye's Principles of medicinal chemistry: Lemke, Williams, Wolters Kluwer, ISBN 0781768799

Selected Medicinal Chemistry Journals:
Journal of Medicinal Chemistry
Journal of Medicinal Chemistry Letters
Bioorganic & Medicinal Chemistry
Bioorganic & Medicinal Chemistry Letters
European Journal & Medicinal Chemistry
ChemMedChem

Final exam:
Instead of a written exam, I will assign each student a drug molecule or you will choose one by yourself if you prefer to do so. You may use the textbook or draw on your personal experiences to select a drug for study. The task for the student is to research this drug and write a 3 page summery. The report should address most, if not all, of the following: discovery, structure, structure-activity relationships, mechanism of action, disease area, potential side effects, synthesis, and other important characteristics (**the summary will be submitted for**

plagiarism checking). Additionally, each student will present this homework in form of a power point slide show within 45 minutes to the class. The grade for this class will be based on the report (50%) and the presentation (50%).

Policies:
UWM: You must follow the policies and procedures outlined in the current Schedule of Classes.
See: http://www.uwm.edu/Dept/SecU/SyllabusLink.pdf
Department of Chemistry: You are expected to fully understand the policies posted on the bulletin boards across from CHM 195 and adjacent to CHM 164.

Incomplete: An incomplete can be given only to a student who has been doing satisfactory (C or better) work but who is unable to continue attending the course for a reason judged valid. The request for an Incomplete must be accompanied by documentation.

Academic Dishonesty: Cheating on an examination or other graded material will result in a grade of zero as a minimum consequence. Failure in the course and referral to the Dean may also occur. In short, academic dishonesty in any form will not be tolerated.

Website: https://uwm.courses.wisconsin.edu/ (Find CHEM 743 once you have logged into D2L).

Tentative Course Outline:
Below is an approximate outline. Changes can occur any time but will be noted in class.

Week	Day	Reading (Graham Patrick, 4th ed.)
1	Friday, Sep. 07, 2018	An introduction to drugs and drug targets, GP, Chapter 1
		Nucleic acids: structure and function, GP, Chapter 6
2	Friday, Sep 14, 2018	Nucleic acids as drug targets, GP, Chapter 9 and GT, Chapter 10
		Nucleic acids as drug targets, GP, Chapter 9 and GT, Chapter 10
3	Friday, Sep 21, 2018	Drug discovery: finding a lead, GP, Chapter 12
		Drug discovery: finding a lead, GP, Chapter 12
4	Friday, Sep 28, 2018	Drug design: optimizing target interactions, GP, Chapter 13
		Drug design: optimizing target interactions, GP, Chapter 13
5	Friday, Oct 05, 2018	Drug design: optimizing access to the target, GP, Chapter 14
		Drug design: optimizing access to the target, GP, Chapter 14
6	Friday, Oct 12, 2018	Getting the drug to the market, GP, Chapter 15
		Case study
7	Friday, Oct 19, 2018	Structure-activity and quantitative structure relationships, GP, Chap 18
		Structure-activity and quantitative structure relationships, GP, Chap 18
8	Friday, Oct 26, 2018	Antibacterial agents, GP, Chapter 19
		Antibacterial agents, GP, Chapter 19
9	Friday, Nov. 02, 2018	Antiviral agents, GP, Chapter 20
		Antiviral agents, GP, Chapter 20
10	Friday, Nov. 09, 2018	Anticancer agents, GP, Chapter 21
		Anticancer agents, GP, Chapter 21
		Case study

11	Friday, Nov. 16, 2018	**Student Presentations**
12	Friday, Nov. 23, 2018	Thanksgiving recess
14	Friday, Nov. 30, 2018	**Student Presentations**
15	Friday, Dec. 07, 2018	**Student Presentations**
17	Dec. 10-14	Final report

Disclaimer:
Teaching policies and regulations for this course are not open for discussion or negotiation. This syllabus has been constructed to be as complete as possible but is by no means a binding document. I reserve the right to alter policies and regulations as needed.

Learning Outcomes:

1. Understand the basic techniques commonly used in drug design
2. Classify the major biological targets of drugs and the types of drug interactions with the targets.
3. Understand the concept of structure-activity relationships, be able to optimize the structure of the lead compound during drug discovery/development, and summarize types of physicochemical parameters commonly used in SAR studies.
4. Understand why water solubility and lipid solubility are important factors related to drug effectiveness and show examples of structural changes and formulations used to alter these properties.
5. Understand that there are often many different biological targets one can choose for a particular disease, and why drug specificity is hard to achieve.
6. Have a molecular level of understanding of the mechanism of action of several common classes of drugs and be able to communicate this understanding either orally or in a written format.
7. Understand the patent process of protecting intellectual property.
8. To gain an appreciation of the interdisciplinary nature this field.