

*Syllabus*  
*CBMC 804a*  
***Biochemical Foundations of Chemical Biology***  
*Spring Semester 2014*  
UNC ESHELMAN SCHOOL OF PHARMACY  
*Section number 001*

**COURSE COORDINATORS**

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**INSTRUCTORS:**

Stephen Frye ([svfrye@email.unc.edu](mailto:svfrye@email.unc.edu), GM 2095, 843-5486)  
Bill Janzen ([bjanzen@email.unc.edu](mailto:bjanzen@email.unc.edu), GM 2092, 843-8461)  
Scott Singleton  
Bryan Roth ([bryan\\_roth@med.unc.edu](mailto:bryan_roth@med.unc.edu), GM 4072, 966-7535)  
Andrew Lee  
Nathaniel Hathaway  
Jian Liu  
Albert Bowers

**COURSE DESCRIPTION**

This course covers core biochemical and molecular biology techniques, concepts, and tools used to conduct research at the interface of chemistry and biology. Topics include enzymology, characterization of drug-target interactions, mechanisms-based inhibitor design, assay design and development, targeting kinases and GPCRs, biopharmaceuticals, gene therapy, nucleic-acid binding agents, information-based drugs, chemical tools to study epigenetics, harnessing biosynthetic pathways for chemical diversity, and other recent advances and techniques in drug discovery. The overall objective of this course is to learn recent advances in applying chemical approaches to explore problems in biology and drug discovery.

**COURSE PREREQUISITES**

CHEM 466, BIOC 505, 601, or PHCO 643; or permission of instructors.

**CLASS MEETING TIMES AND LOCATIONS**

Lecture will be given at TBA from 9:00 – 9:50 am on Monday, Wednesday, and Friday.  
The course schedule is posed on Sakai: <https://www.unc.edu/sakai>

**TEXTBOOK AND COURSE MATERIAL**

*Online textbooks:*

Evaluation of enzyme inhibitors in drug discovery [electronic resource]: a guide for medicinal chemists and pharmacologists.  
<http://site.ebrary.com/lib/uncch/docDetail.action?docID=10114176>

Each instructor will also assign reading from the scientific literature and provide handouts or PowerPoint slides for corresponding lectures.

**Project**

Each student needs to select one or two related drug molecules, new drug targets, or new chemical biology approaches at the beginning of the semester for a project. Each project requires a 30 min oral presentation which will be given in the companion seminar course 804b, and a maximum of 20 pages, double spaced paper. The page limit includes figures but not references.

**SAKAI**

The contents of this course will be available through Sakai. Please contact Dr. Rihe Liu and individual instructors for details.

**STUDENT EVALUATION AND COMPETENCIES**

The system of student evaluation fosters self-initiated learning. Testing procedures will condition students for the integration and application of principles, critical thinking and problem-solving rather than for short-term retention or memorization of specific details or isolated facts. Exams will primarily be take home with some in class components.

The final grade in the course will be determined according to the system below.

Three exams	25 for each %
Project paper	20%
Problem sets and participation	5%
Total	100 %

<b>Guidelines for the Assignment of Letter Grades</b>	<b>Letter Grade</b>	<b>Numerical Scale</b>
The H grade clearly indicates the student has shown such outstanding promise in all aspects of the course. Demonstrates frequent engagement with students and faculty in discussion in a manner that demonstrates clear mastery of subject matter; superior knowledge in terms of breadth and depth, and clear evidence of creative thought.	<b>H</b>	90 - 100
The P grade indicates the student has shown solid promise in the aspect of the course. Demonstrates occasional engagement with students and faculty in discussions and demonstrates good but not outstanding mastery of breadth and depth of knowledge of the subject matter; an appropriate level of ability to synthesize and extend understanding beyond knowledge base; some evidence of creative thought.	<b>P</b>	70 - 89

The L grade states that, while not yet showing unusual promise, the student demonstrates reasonable hope of intellectual development. Demonstrates engagement with students and faculty in discussions but demonstrates a limited breadth or depth of knowledge; limited evidence of minimal competency; limited ability to synthesize and extend understanding beyond knowledge base; little evidence of creative thought.	<b>L</b>	60 - 69
A grade of F should warrant questioning whether the student may suitably register for further study in CBMC. No understanding of subject matter; evidence of major deficiencies in subject matter; insufficient breadth and depth of knowledge; absence of ability to synthesize and extend.	<b>F</b>	0 – 59

**COURSE POLICY REGARDING ATTENDANCE AND MISSED EXAM AND ASSIGNMENT POLICY:**

Attendance is required. Late assignments will not be accepted unless there is a valid excuse (severe health issues, travel to scholarly conferences, or familial circumstances) and will be considered on an individual basis. Exams may be taken later than the scheduled time in extreme cases (e.g. severe health issues or death in the family, travel to a scholarly conference associated with the professional program) and will be considered on an individual basis. Holiday travel is not a valid excuse for missing an exam. Contact Drs. R. Liu or Jarstfer regarding circumstances that may make it difficult to be present for any exam.

**AND RE-TESTING OF LEARNERS WITH NON-PASSING COURSE GRADES**

There is no remediation for the course and no re-testing will be available.

**OFFICE HOURS:**

You should seek help from the course professors and other students. Professors will be available upon request or will post their open office hours on Sakai. Some office hours will be conducted using the blogging function on Sakai

**STUDENTS WITH DISABILITIES**

The UNC Eshelman School of Pharmacy is committed to providing reasonable accommodations for all persons with documented disabilities or accessibility concerns in accordance with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990. If you have a medical condition, disability, or accessibility concern that may impact your ability to meet the academic demands or requirements of the course, please contact Accessibility Resources and Services in person at the Student and Academic Services Building (SASB) Suite 2126, by email at [accessibility@unc.edu](mailto:accessibility@unc.edu) or via the web site at <http://accessibility.unc.edu>.

**COURSE EVALUATION:**

Students are **required** to complete the course evaluation. *Students who do not wish to complete the evaluation may obtain a waiver from the Assistant Dean and Director of Graduate Studies (Dr. Hawke) by submitting a written request stipulating their reason(s), or receive an “incomplete” grade for the course.* This is a course requirement and a responsibility of all students completing a course.

Student feedback is essential and highly valued in the School’s efforts to continually improve the quality of courses and the effectiveness of our faculty as educators. As a faculty, we can assure you

that your feedback is reviewed in detail. The evaluations are taken very seriously by course directors, individual instructors, and the School. In 2011, the School implemented new policies and procedures for course evaluations, which include specific guidance on how the findings are used by the School as a means of continued quality improvement. More information about the policy and insight into how we use your feedback can be found here: <http://pharmacy.unc.edu/about-us/school-organization/office-of-strategic-planning-and-assessment/course-evaluations>.

Unless otherwise requested. Online graduate course evaluations will be available to students during the last 2 weeks of the Graduate Program semester: April TBD (open) through May TBD (close). Students will receive an email message directing them to a website where they can complete their course evaluations. The course evaluation must be completed by midnight **[TBD]** to receive a final grade in a course. Those not completing the evaluation, or not obtaining an evaluation waiver, will receive an “incomplete” grade for the course. All course evaluations are confidential and anonymous.

**HONOR CODE:**

The principles of academic honesty, integrity, and responsible citizenship govern the performance of all academic work and student conduct at the University as they have during the long life of this institution. Your acceptance of enrollment in the University presupposes a commitment to the principles embodied in the Code of Student Conduct and a respect for this most significant Carolina tradition. Your participation in this course comes with the expectation that your work will be completed in full observance of the Honor Code. Academic dishonesty in any form is unacceptable. If a violation is suspected, it may be reported to the Student Attorney General’s Office. If you have any questions about your responsibility or the responsibility of faculty members under the Honor Code, please visit the Office of Student Conduct web site (<http://studentconduct.unc.edu>), consult the Graduate and Professional Student Attorney General ([gpsag@unc.edu](mailto:gpsag@unc.edu)), or contact a representative within the UNC Eshelman School of Pharmacy.

**SYLLABUS CHANGES:**

The course director reserves the right to make changes to the syllabus, including project due dates and test dates, when unforeseen circumstances occur. These changes will be announced as early as possible so that students can adjust their schedules.

## MedChem 804

**Semester: Spring 2014**

**Credit hours: 3**

**Coordinator: Rihe Liu and Michael Jarstfer**

**Instructors:**

**Stephen Frye (svfrye@email.unc.edu, GM 2095, 843-5486)**

**Bill Janzen (bjanzen@email.unc.edu, GM 2092, 843-8461)**

**Rihe Liu (rliu@email.unc.edu, Beard Hall 213, 843-3635)**

**Bryan Roth (bryan\_roth@med.unc.edu, GM 4072, 966-7535)**

**Class**

**Topic**

### **Proteins in Chemical Biology and Medicinal Chemistry**

Lecture

1	Introduction: Classification of Drug Targets and Pharmaceuticals	
2	Proteins: Structure	M. Jarstfer
3	Enzyme kinetics and mechanisms	M. Jarstfer
4	Enzyme kinetics and mechanisms	M. Jarstfer
5	Enzyme inhibition kinetics	M. Jarstfer
6	Enzyme inhibition kinetics	M. Jarstfer
7	Inhibition mechanism and drug design	M. Jarstfer
8	Inhibition mechanism and drug design	M. Jarstfer
9	Inhibition mechanism and drug design	M. Jarstfer
10	ATP-Binding sites as a target	Singleton
11	ATP-Binding sites as a target	Singleton
12	TBA	Frye
13	TBA	Frye
14	TBA	Frye
18	Receptor pharmacology	Roth
19	Receptor Assays	Roth
15	High Throughput Screening and Profiling	Janzen
16	Assay Development and Case Study	Janzen
17	Target Cloning, Expression and Characterization	R. Liu
18	Signal Detection Using Reporter Genes	R. Liu
19	Signal Detection Using Multiple Modalities	R. Liu
20	Protein Drugs and Biologics	R. Liu
21	Protein Targeting Ligands	R. Liu

### **Nucleic Acids in Chemical Biology and Medicinal Chemistry**

22	Nucleic Acid structure	M. Jarstfer
23	RNA-structure and drug interactions	M. Jarstfer
24	Targeting nucleic acids	M. Jarstfer
25	RNAi/miRNA	M. Jarstfer
26	RNAi, antisense	M. Jarstfer
27	Nucleic Acid Aptamers	R. Liu

### **Advanced Topics in Chemical Biology and Medicinal Chemistry**

28	Molecular Display Technology	R. Liu
29	Cell Surface Display Technology	R. Liu
30	Bioorthogonal and Arrays in Target Identification	R. Liu
31	Antibody-Drug Conjugation	R. Liu
32	Targeting Protein-Protein Interactions	R. Liu
33-36	Harnessing biosynthetic pathways	J Liu, A. Bowers
37-38	Molecular techniques to study chromatin remodeling	N. Hathway
39-40	The Power of NMR in Chemical Biology	D. Lee