

## Advance Topics in Biochemistry

6510 section 01 (graduate students)

4510 section 01 (advanced undergraduate students)

**Instructor:** Dr. Thomas Leeper, SL3006, tleeper@kennesaw.edu, (470) 578-2258

**Office Hours:** Mondays and Thursdays 11am-noon or by appointment: <https://thomas-leeper.youcanbook.me>

**Location:** Clendenin Building - 2005

**Days & Times:** TuTh 9:30am – 10:45am

**Description:** Paper reading class examining structural and biophysical methods to study proteins and nucleic acids. These will include nuclear magnetic resonance spectroscopy (NMR), X-ray crystallography and mass spectrometry plus other techniques. Extensive participation and discussion required. Recommended prerequisite: Any biochemistry course at any university.

**Course objectives:** **1)** Practice reading and understanding biochemical research articles. **2)** Develop skills required to judge the quality of structures deposited in the PDB. **3)** Establish an understanding of how structural quality relates to the ability to answer questions about biology and chemistry. **4)** Provide guidelines for incorporating structural aspects into the participants' own research projects. **5)** Hone and develop the students' scientific writing proficiency.

**Required textbook: None.** Recommended: Voet, Voet, and Pratt, Fundamentals of Biochemistry; OR: Voet and Voet, Biochemistry. *Optional textbook:* Liljas et al. Textbook of Structural Biology;

### Schedule (tentative):

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| August 14 <sup>th</sup>                       | <b>Syllabus and biochemistry review</b>  |
| August 16 <sup>th</sup>                       | <b>Biostructural techniques I, X-ray crystallography:</b><br>Classic paper discussion: Kendrew et al. (1958) <i>Nature</i> , 181, 662-6.   |
| August 21 <sup>st</sup> & 23 <sup>rd</sup>    | <b>Biostructural techniques II, NMR spectroscopy:</b><br>Paper discussion: Cañadillas et al (2006) <i>PNAS</i> , 103, 2109-14.   |
| August 28 <sup>th</sup> & 30 <sup>th</sup>    | <b>Biostructural techniques III, Mass spectrometry and cryo-EM:</b><br>Paper discussion: Davis et al. (2016) <i>Cell</i> , 167, 1610-22.   |
| Sept. 4 <sup>th</sup> to 13 <sup>th</sup>     | <b>Putting these techniques together, four papers on influenza virus:</b> Bullough et al. (1994) <i>Nature</i> , 371, 37-43; Cady et al. (2010) <i>Nature</i> , 463, 689-92; Lorieau et al. (2012) <i>PNAS</i> , 109, 19994-9; Moeller et al. (2012) <i>Science</i> , 338, 1631-4. |
| Sept. 18 <sup>th</sup>                        | <b>Quorum sensing in bacteria:</b> Lintz et al. (2011) <i>PNAS</i> , 108, 15763-8.   |
| Sept. 20 <sup>th</sup> & 25 <sup>th</sup>     | <b>CRISPr:</b> papers TBD.   |
| <b>Sept. 27<sup>th</sup></b>                  | <b>Midterm exam – paper to read in advance TBD</b>   |
| Oct. 2 <sup>nd</sup>                          | <b>Biolayer interferometry &amp; sensor gram methods:</b> paper to be determined.  |
| Oct. 3 <sup>rd</sup>                          | <i>Last day to withdraw without academic penalty.</i>  |
| Oct. 4 <sup>th</sup> to Nov. 15 <sup>th</sup> | <b>Student lead paper discussions Session A:</b> (~5-6 presentations), must use NMR, crystallography, cryo-EM, or biophysical techniques to study a biochemical question and have a publication date of 2014 or later.   |
| Nov. 22 <sup>nd</sup> & 24 <sup>th</sup>      | <i>Fall break</i>  |
| Nov 27 <sup>th</sup> & 29 <sup>th</sup>       | <b>NMR and crystallography demos:</b> student samples allowed & encouraged.  |
| Tues. Dec 4 <sup>th</sup> (finals)            | Peer evaluation and draft submission. Meet in classroom from 10:30am to 12:30.   |
| Mon. Dec 10 <sup>th</sup>                     | Final version of final paper due at noon.  |

**Grading Policy:**

25% of grade determined by paper discussion participation (evaluated by the instructor)  
25% determined by midterm exam  
25% of grade by peer and faculty evaluation of student lead paper discussion  
25% final paper (article review), extra credit possible.

**Grading scale:** A (90.00%), B (78.00%), C (65.00%), D (50.00%), F (<50%).

**Disability:** Any student with a documented disability needing academic adjustments is requested to notify the instructor as early in the semester as possible. Verification from KSU disAbled Student Support Services is required (see Student Center room 267). All discussions will remain confidential.

**Student athletes:** Student athletes are required to contact their course instructor during the first week of class with their schedule of planned events that are away from campus.

**Academic honesty:** The policy on academic honesty is given in the college catalog and the student handbook. It is summarized below. Students failing to adhere to this policy will be held accountable. Cheating--in any form--is considered a serious offense and will be treated as such.

Plagiarism is defined in dictionaries as the wrongful appropriation, close imitation, or purloining and publication, of another author's language, thoughts, ideas, or expressions, and the representation of them as one's own original work. The previous sentence is taken verbatim from the Wikipedia without the use of quotes or footnotes. Thus, this paragraph would be in violation of plagiarism and would be an example of something that is **not acceptable** in your assignments. Plus, the Wikipedia is a lame source.

Also unacceptable is the copying of your colleague's answers or stealing copies of the tests or any practice that improves one's grade without actually improving one's ability to demonstrate mastery of the material. It should go without saying, but I will say it explicitly anyway: **Don't cheat!**

**Academic Integrity Statement (Required):** Every KSU student is responsible for upholding the provisions of the Student Code of Conduct, as published in the Undergraduate and Graduate Catalogs. Section II of the Student Code of Conduct addresses the university's policy on academic honesty, including provisions regarding plagiarism and cheating, unauthorized access to university materials, misrepresentation/falsification of university records or academic work, malicious removal, retention, or destruction of library materials, malicious/intentional misuse of computer facilities and/or services, and misuse of student identification cards. Incidents of alleged academic misconduct will be handled through the established procedures of the Department of Student Conduct and Academic Integrity (SCAI), which includes either an "informal" resolution by a faculty member, resulting in a grade adjustment, or a formal hearing procedure, which may subject a student to the Code of Conduct's minimum one semester suspension requirement. See also <http://www.kennesaw.edu/scai/content/ksu-student-code-conduct>.

**Disruption of Campus Life Statement:** It is the purpose of the institution to provide a campus environment, which encourages academic accomplishment, personal growth, and a spirit of understanding and cooperation. An important part of maintaining such an environment is the commitment to protect the health and safety of every member of the campus community. Belligerent, abusive, profane, threatening and/or inappropriate behavior on the part of students is a violation of the Kennesaw State University Student Conduct Regulations. Students who are found guilty of such misconduct may be subject to immediate dismissal from the institution. In addition, these violations of state law may also be subject to criminal action beyond the University disciplinary process.