Part 2 - Dr. Evans (October 23 – December 01)

1. Review of protein and peptide structure (1.0 hours)
    - Secondary structures as a structural biologist looks at them. STRUCTURE = FUNCTION, peptide bonds – amide & imide, Ramachandran plots, α-helix, 4-helix bundle, globin fold, β-sheet, β-bulges, Υ-turns, antibody fold, Rossmann fold, jellyroll, TIM barrels, etc.
2. Introduction to concepts of protein folding (3.0 hours)
    - Levinthal paradox.
    - The "classical" view of protein folding.
    - Methods to characterize protein folding: UV-Vis; NMR; X-ray scattering.
    - Isomerization of peptide bonds as a rate-limiting step in protein folding.
    - Disulfide bond formation as a rate-limiting step in protein folding.
    - Cellular strategies: chaparones & chaparonins.
    - Simple concepts of proteins folding, including the 'molten globule', nuclear condensation, hydrophobic collapse, etc.
    - Introduction to ! -value analysis.
3. Structure determination by protein crystallography (8 hours)
    - Crystal symmetry: What are crystals? Why use crystals?
    - X-ray scattering of a crystal: Bragg's law.
    - Crystal quality & data resolution.
    - What information can be obtained from each determination?
    - The phase problem: Heavy atoms, MAD & molecular replacement.
    - Electron density maps.
    - Data collection & structure fitting.
    - Refinement of protein structures & indicators of 'correctness'.
4. Structure determination by NMR (1.5 hours)
    - Larmour frequency & proton coupling.
    - Comparison of NMR of small molecules and proteins.
    - Fourier Transform methods for data collection.
    - NOE and multi-dimensional NMR.
    - Comparison of X-ray and NMR methods.
5. Small-angle X-ray scattering (SAXS) (1.5 hours – given by Dr. Boraston)
    - The hierarchy of structure: modularity and quaternary structure.
    - XRC vs NMR vs SAXS.
    - SAXS data and its analysis.
    - Modeling with SAXS data.
6. Real-world examples (3.0 hours)
    - Literature examples of structure determination and examples of how macromolecular structure determines function.

Assessment of Student Performance

(1) **Techniques to be used in assessment of student's performance in course**:

- Grading of multiple choice, short answer and/or essay examination questions.

(2) **BIOC 404 - Evaluation and weighting (undergraduate students)**:

- Midterm – **Thursday, October 16th** 40%
- Final examination (2 hours): 60%

Both examinations must be written in order to avoid receiving an "N" grade.

(3) **Revised UVic Grading Scheme (effective May 1, 2012)**

Passing Grades	Grade Point Value	Percentage for Instructor Use Only *	Description
A+	9	90 – 100	**Exceptional**, **outstanding** and **excellent** performance. Normally achieved by a minority of students. These grades indicate a student who is self-initiating,
A	8	85 – 89	
A-	7	80 – 84	

COURSE EXPERIENCE SURVEY (CES)

I value your feedback on this course. Towards the end of term, as in all other courses at UVic, you will have the opportunity to complete an anonymous survey regarding your learning experience (CES). The survey is vital to providing feedback to me regarding the course and my teaching, as well as to help the department improve the overall program for students in the future. The survey is accessed via MyPage and can be done on your laptop, tablet, or mobile device. I will remind you and provide you with more detailed information nearer the time but please be thinking about this important activity during the course.

DEPARTMENT INFORMATION AND POLICIES

1. The Department of Biochemistry and Microbiology upholds and enforces the University's policies on academic integrity. These policies are described in the current University Calendar. All students