BMB 632
Probing structure and function of complex RNA-protein machines
Instructor: Kristen W Lynch
T/Th, 10:30-12:00
CRB 302

Summary:
RNA-Protein complexes or RNPs can range from simple assemblies to megadalton enzymatic machines. The latter include two of the most abundant and essential enzymatic complexes for converting genes to functional protein – the ribosome and the spliceosome. Understanding the molecular interactions that hold these RNPs together and how these complexes function has required the development of new techniques and pushed the boundaries of quantitative biochemistry. In this course we will take an in-depth look at general concepts common to many RNA binding proteins, the methods used to study protein-RNA and RNA-RNA interactions, and how the complex nature of large RNPs uniquely allow them to achieve their precise functions. The course will be a combination of both lectures and student-lead discussion of recent literature. Students will be evaluated based on their presentations of primary literature and their participation in class discussion and a final oral exam.

Syllabus:

Sept 10 **organizational meeting at 11:30-12,** 12-1 RNP DISCUSSION GROUP

Sept 17 Overview of RNA-Protein Machines

Sept 24 Basic Methodology & RNA Folding I: reverse transcription, RT-PCR, footprinting

Oct 1 Group I/II Self Splicing: RNA Folding II - NAIM

Oct 8 RNP DISCUSSION GROUP (12-1 pm)

Oct 15 Riboswitches: RNA Folding III - SHAPE & in-line probing

Oct 17 Pre-mRNA splicing: Native/denaturing RNA gels

Oct 22 Regulation of pre-mRNA splicing and RNA-binding proteins I: Identifying and characterizing specificity: UV crosslinking, affinity purification, EMSA

Oct 24 RNA-binding proteins II: Quantifying RNA-protein affinity: filter binding and EMSA

Oct 29 Regulation of pre-mRNA splicing II: RNA-purification techniques, psoralen crosslinking, site-specific labeling

Oct 31 RNA-binding proteins III: Structural and conformation determination

Nov 5 RNA-binding proteins IV: Structural and conformation determination: SAX

Nov 7 NO CLASS – BMB RETREAT

Nov 12 RNP DISCUSSION GROUP (12-1 pm)

Nov 14 Ribosome: gRNAs, H/ACA complex and Nucleotide modification

Nov 19 Telomerase: applying concepts to another RNP machine

Nov 21 Seeing large eukaryotic RNA-Protein machines: EM

Nov 26 Dynamics in RNA-Protein machines I: NMR

Nov 28 NO CLASS - THANKSGIVING

Dec 3 Dynamics in RNA-Protein machines II: FRET and Single molecule work

Dec 5 Global Studies: RNA-Seq & CLIP-Seq