BIOC 632, Course Syllabus **Spring, 2020**
Drs. Baldwin, Strahl and Marzluff **MWF 9-10 A.M. 6004 Marsico Hall**

January 8 Introduction and Historical Perspectives on Regulation of Gene Expression (Baldwin)

January 10 Lac Operon, Sigma Factor, and Introduction to promoters (Baldwin)

January 13 cAMP and CAP, Lac Operon Revisited. Introduction to Phage Lambda (Baldwin)

January 15 Phage Lambda Gene Regulation, and Trp Operon/Attenuation (Baldwin)

January 17 Basic Eukaryotic Gene Transcription (Strahl)

January 20 **Martin Luther King Holiday**

January 22 Role of the C-terminal Domain of RNA pol II; Elongation cycle (Strahl)

MINI EXAM (covering the first six lectures)

January 24 Enhancers, locus control regions, silencing elements, insulators and gene organization. Introduction to transcription factor structure/function (Baldwin)

January 27 Transcription Factors, Genomic Imprinting (Baldwin)

January 29 DNA Methylation and Genomic Silencing (Strahl)

January 31 DNA de-methylation: Breaking the Dogma of DNA Methylation Silencing (Strahl)

February 3 Chromatin Structure and Mechanisms of Transcription Through It (Strahl)

February 5 Introduction to Histone Modifications: Acetylation as a Paradigm (Strahl)

February 7 3D Chromatin and looping in gene expression (Dowen)

February 10 Role of Histone Methylation in Heterochromatin Formation and Gene Silencing (Strahl)

February 12 Roles of Histone Methylation in Transcription Elongation (Strahl)

February 14 Histone Demethylation in Gene Regulation (Strahl)

February 17 ATP-Dependent Chromatin Remodeling in Transcriptional Regulation (Strahl)

February 19 Histone Code Hypothesis and Mechanisms of Chromatin Engagement (Strahl)

February 21 Inducible transcription factors: NF-κB and p53 (Baldwin)

February 24 p53 (Baldwin)

February 26 Transcription and cancer (Baldwin)

February 28 More cancer mechanisms and HIV Transcription (Baldwin)

March 2 Nuclear hormone receptors I (Baldwin)

March 4 Nuclear hormone receptors II (Baldwin)

March 6 Weather make-up day

(MIDTERM EXAM given out March 6)

SPRING BREAK MARCH 9-15

March 16-April 24 (RNA Metabolism and posttranscriptional regulation (Marzluff)

March 16 RIBOZYMES: tRNA processing: RNase P: an RNA enzyme

March 18 Capping and Polyadenylation

SECTION MEETING 1 ENZYMES IN rRNA PROCESSING

Mar. 20 Gene organization: hnRNPs and snRNPs: splicing

Mar. 23 Exon definition: coupling of splicing and polyadenylation

Mar. 25 Alternative splicing I: Drosophila sex determination

SECTION MEETING 2: ALTERNATIVE SPLICING AND DISEASE: SMA and SMN

Mar. 27 Alternative splicing II: coupling splicing and transcription

Mar. 30 Histone mRNA processing and regulation

April 1 Regulation of transcription elongation: P-TEFb and HIV-Tat

SECTION MEETING 3: TRANSLATIONAL REGULATION IN XENOPUS DEVELOPMENT

April 3 Translation regulation: cytoplasmic polyadenylation

April 6 Mechanism of mRNA Degradation

April 8 Exon junction complexes and Nonsense Medicated Decay

SECTION MEETING 4: Alternative splicing regulation of neural development

April 10 Holiday

April 13 siRNAs: structure/function of “Slicer”

April 15 Mechanism of Micro RNA function

April 17 PAR-CLIP: Identification of protein binding sites on mRNAs

SECTION MEETING 5 miRNA regulation of development

April 20 Long “noncoding” RNAs: roles in regulating development and mRNA degradation

April 22 Alternative polyadenylation

SECTION MEETING 6: regulation of gene expression in stem cells

April 24 Novel RNAs: CrispR, circular RNAs and transcribed “pseudogenes

FINAL EXAM (Marzluff portion of the class)