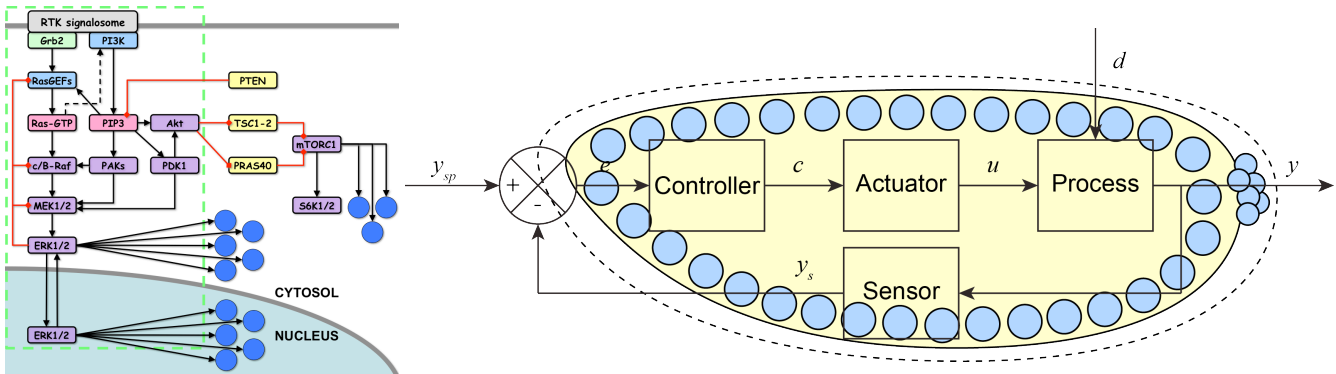


CHE 596, Section 021: Biological Dynamics: from Molecules to Tissues
Fall 2017, 3 credit hours
Meets 3:00-4:15 p.m. Tue/Thur in 2220 EB3

Prof. Jason Haugh
 jason_haugh@ncsu.edu

Prof. Gregory Reeves
 gtreeves@ncsu.edu

Course Description: This specialty course will introduce students to engineering principles, computational models, and quantitative experiments that connect our understanding of biological processes across molecular, cellular, and tissue-level scales of complexity. Biomedical applications include mechanisms of disease progression, design of targeted therapies, and regenerative medicine. Engineering principles discussed will include process control, tissue and cell size constraints, and trade-offs/optimization. Synthesis and analysis of relevant literature and the use of modeling software tools will be prominently featured.



Course Prerequisites: This course is designed for graduate students in engineering and the sciences; some mathematics background with a course in ordinary differential equations is highly recommended. Undergraduates who have taken MA 341, Differential Equations and BCH 451, Introduction to Biochemistry (or equivalent courses) may also enroll.

Course Topics:

Molecular scale	Cellular scale	Tissue scale
Molecular recognition Receptor dynamics Signal transduction Gene regulation	Cell cycle Differentiation Apoptosis Cell motility	Developmental patterning Immune responses Wound repair Cancer
Engineering Principles Feedback/feedforward control Robustness Size constraints/scaling		