Temporal Biology Seminar: Phenology

Phenology, the timing of annual life cycle events, is a critical trait in living organisms, influencing and being influenced by the evolution and ecology across many scales. In this graduate seminar we will discuss the biological underpinning and implications of phenology through primary scientific literature.

the course will meet once per week for a 3 hour discussion based lecture. *Prerequisites:* Introductory course in ecology and evolution , or permission of instructor.

Week	Topic	Lecture Focus	Readings
Part I: Fundamentals			
Week 1	Introductory Remarks	What is phenology anyway?" and is phenology a "trait"?	Forest and Rushing 2010 Lechowicz 1984, Ollerton 1992,
Week 2	Environmental Cues	Environental factors influencing phenology and modeling phenological responses to environments	Rathke and Lacey 1985 Chuine 2000, Fu 2014
Week 3	Physiology of Phenology	How/Where do plants perceive their environment? and genetic regulation of phenology	Bernier 2005 Wilczek 2010, Visser 2010
Week 4	Evolution of Phenology	Heritability and local adaptation of phenology	Liepe 2016 Vitasse 2009
Week 5	Carryover effects	Phenological sequences Maternal effects	Lechowicz 1995, Gougherty 2018 Johnsen 2005, Auge 2017
Part II: Function			
Week 6	Ecosystem Ecology	Phenology, fluxes and feebacks	Richardson 2013 McKown 2012
Week 7	Community Ecology	Temporal Niches Phenology and Competition	Fargione 2005 Ross 1972, Wainwright 2011
Week 8	Evolutionary biology	Phenological speciation: Allochrony Phenology and life history evolution	Hipperson 2016, Taylor 2017 Burghardt 2015, Rubin 2018
Part III: Phenology in a changing world			
Week 9	Phenological Shifts	Observed changes	Menzel 2006, Fu 2015 Ffrench-Constant2016, Da Silva 2015
Week 10	Invasion	Phenology as a mechanism of invasion Rapid evolution of phenological response	Wolkovich 2013, Gioria 2017 Montague 2008, Franks 2007
Week 11	Phenology and Extremes	False Spring Drought	Gu 2008 Ivits 2014, Cui 2017
Week 12	Phenological Mismatches	Pollinator networks Herbivory and Predation	Kudo 2003, Petanidou 2014 Kharouba 2015, Yang 2010

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