

Syllabus for ATMO 402: Applied Dynamics

Part I Revisiting the fundamentals (3 week)

(HOLTON: CH1-4)

- 0) Introduction
- 1) Total differentiation, reference framework
- 2) Basic equations
- 3) Scale analysis, Simplifications (Geostrophic, Hydrostatic and thermal wind balances),
- 4) Circulation, Vorticity, Potential Vorticity,

Part II Wave dynamics (3-4 weeks)

(HOLTON: Ch5)

- 1) Perturbation and linearization,
- 2) Sound waves
- 3) Gravity waves
- 4) Rossby waves

Part III Extratropical Cyclones and Quasi-geostrophic Analysis (3-4 weeks)

(HOLTON: Ch6)

- 1) observed structure and evolution
- 2) QG approximation
- 3) QG PV and PV thinking
- 4) vertical motion

Part IV PBL Dynamics, Front Genesis, Hurricane Dynamics (3 week)

(HOLTON: CH8,9, parts)

- 1) PBL and Sources of turbulence
- 2) 3-force momentum balance, Ekman pumping
- 3) Front Genesis
- 4) Hurricane Dynamics

Text: Introduction to Dynamic Meteorology, Holton, 5th edition

Grading policy: home work (20%), 2*Quiz (40%), Final (40%)

Student learning outcome: Student to master the advance concepts of dynamics, includes vorticity, wave dynamics, QG dynamics and cyclone-development, jet stream, fronts and frontal genesis, and some basic concept of TC dynamics.

A Sample Schedule for ATMO 402 (Spring 2020)

	Tu	Th	
Week 1	Jan 13 Syllabus & Intro	Jan 17 Part I	
Week 2	Jan 20 (Holiday)	Jan 24 Part I	
Week 3	Jan 27 Part I	Jan 31 Part I	
Week 4	Feb 3 Part I	Feb 7 Part II	
Week 5	Feb 10 Part II	Feb 14 Part II	
Week 6	Feb 17 (Holiday)	Feb 21 Part II	
Week 7	Feb 24 Part II	Feb 28 Part II	
Week 8	March 2 Part II	March 6 Quiz #1	
Week 9	March 9 Part III	March 13 Part III	
Week 10	March 16 Spring Break	March 20 Spring Break	
Week 11	March 23 Part III	March 27 Part III	
Week 12	March 30 Part III	April 3 Part III	
Week 13	April 6 Quiz #2	April 10 (Holiday)	
Week 14	April 13 Part IV	April 17 Part IV	
Week 15	April 20 Part IV	April 24 Part IV	
Week 16	April 27 Part IV	May 1 Part IV	
Week 17	May 4 Review	May 8 Final (exam)	
Week 18	Free	Free	