

Background

- 12-credit, two-semester Capstone sequence for B.S. in Meteorology
- Must complete Dynamics I & II and Physical Met (junior year)
- Lectures 2x week, 150 min total
- Labs 3x week, 375 min total
- After two semesters, 263+ total contact hours with students!
- Course structure inspired by "disconnects" between undergraduate student education preparation and operational expectations (Blackwell 2011)

Approach

- Lectures focus on synopticdynamic meteorology topics
- Labs apply Lecture topics through exercises, real-time city forecasts and student-led current weather discussions

Approach (-cont.)

- Each semester, 8-10 cities chosen to reinforce topics covered in lecture (e.g., located in different parts of mid-latitude cyclone)
- Throughout year, students present as many as six current weather discussions (example, Fig. 1)
 - Graded on application of theory to real-time weather situations
 - Detailed student-led Q&A followed by one-on-one instructor debrief

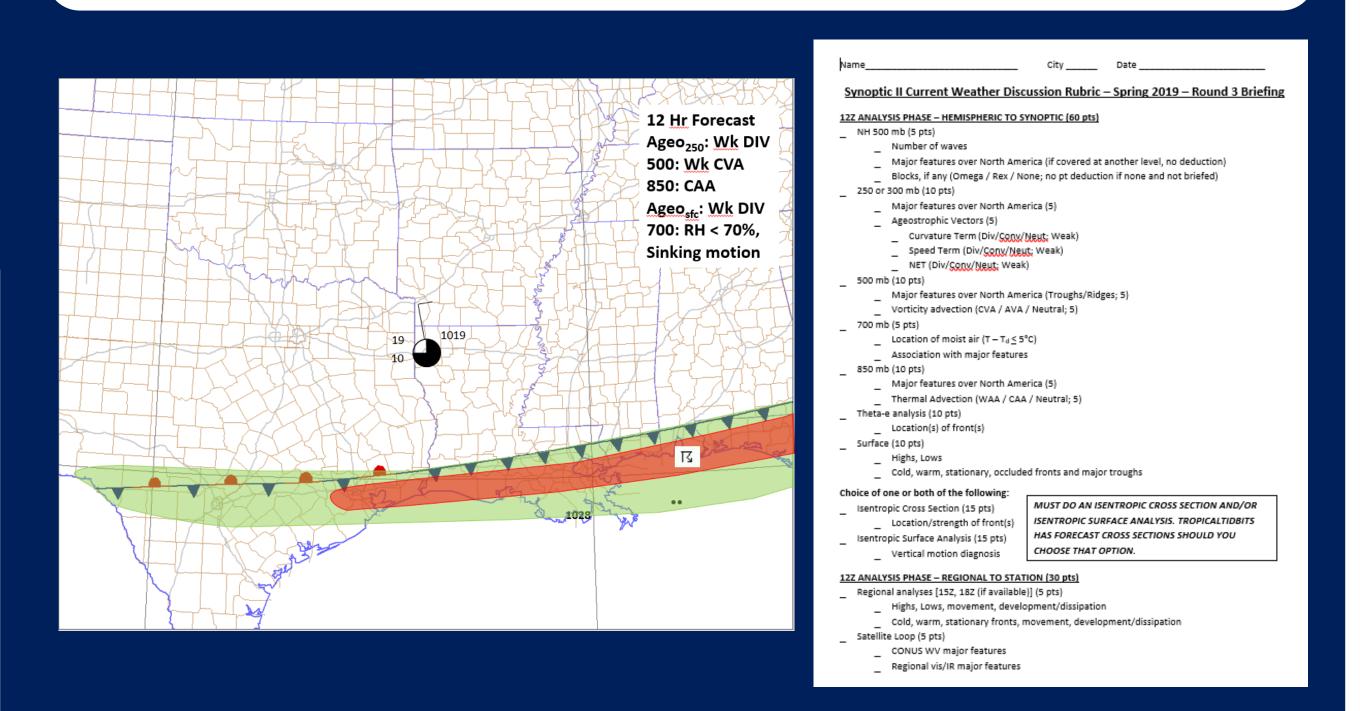


Fig. 1. Example of student forecast discussion slide with summary of vertical motion terms (left); Page 1 of discussion grading rubric (right)

If You Had Nine Contact Hours a Week for a Capstone Course, What Would You Teach? The Synoptic Meteorology Capstone Sequence at the University of South Alabama John M. Lanicci, D. Andrew Murray, and Keith G. Blackwell Department of Earth Sciences, University of South Alabama, Mobile, AL 36688

Use of NWP

- In fall, NWP not used in city forecasts or current weather discussions except for 850-, 500-mb charts (QG applications)
- City forecasts are trends only in fall semester to keep students from becoming 'fixated on numbers' (Fig. 2, left
- Spring semester more practicumbased—'open playbook' includes all NWP products and applications such as MOS, NBM (Fig. 2, right)

		Official City Weather Forecast Form																	
Station _	I	Date	Name					Station		Date		Name							
Station W	eather Table (S	Shaded entries a	re worth double point	s; see score	sheet for details)			Observed	Observed	12.1	Verif	24.5	Varie	261	Varie	40.5	1	60-h	37.
Category	00Z	12Z	00Z	00Z	12Z Tomorrow	12Z		Observed Weather	Observed Weather	12-h Forecast	Verifi- cation	24-h Forecast	Verifi- cation	36-h Forecast	Verifi- cation	48-h Forecast	Verifi- cation	Forecast	Ve
5.	Last Evening	This Morning	This Evening /pm	Verif.	Morning	Verif	Category	00Z Last Night	12Z This	00Z Thin Evening	Verific cation Error	12Z Tomorrow Morning	Verific cation Error	00Z Tomorrow Evening	Verifi- cation Error	12Z Day after Tomorrow	Verific cation Error	00Z Day after Tomorrow	So ca Ea
Date/Local Time:	/ pm	/ am	рш		/am		Date/Local Time:	_/pm	Morning /sm		Points		Points	_/pm	Points		Points	pm	
0 mb Height (dm)			++/+ / 0 / -/		++/+ / 0 / -/		Min Temperature (°C) [previous 12-k]												
0 mb Temperature (°C)			++/+/0/-/		++/+ / 0 / -/		Max Temperature (°C) [previous 12-k]											·'	
0 mb Dew Point Depression (°C)			++/+/0/-/		++/+ / 0 / -/		Surface Temperature (°C)											·'	
00 mb Wind Direction (Degrees)							Surface Dew Point (°C)											′	_
00 mb Wind Speed (kt)			++/+/0/-/		++/+ / 0 / -/		Surface Wind Direction (nearest 10")											′	+
							Surface Wind Speed (knots) Max Wind Speed (knots) [previous13-k]											′	+
50 mb Height (dm)			++/+/0/-/		++/+ / 0 / -/		Sea Level Pressure (mb)												+
50 mb Temperature (°C)			++/+ / 0 / -/		++/+ / 0 / -/		Cloud Cover (CLR. FEW, SCT. BKN, OVC.												+
50 mb Dew Point Depression (°C)			++/+/0/-/		++/+ / 0 / -/		OBV)												
50 mb Wind Direction (Degrees)							Cloud Ceiling (NAM Category 1, 2, 3, 4, 5, 6,											,	
50 mb Wind Speed (kt)			++/+/0/-/		++/+ / 0 / -/		Visibility (NAM Category 1, 2, 3, 4, 5, 6, 7)												+
							Observed Weather												-
ea Level Pressure (mb)			++/+/0/-/		++/+ / 0 / -/		12 hr Precipitation Probability (%)			%		%		%		%		%	
urface Temperature (°C)			++/+/0/-/		++/+ / 0 / -/		Precipitation Category (previous 12-k)												
urface Dew Point (°C)			++/+/0/-/		++/+/0/-/		Precipitation Type	Liquid/	Liquid/	Liquid/		Liquid/		Liquid/		Liquid/		Liquid/	
loud Cover (CLR, SCT, BKN, OVC/OBS)							(Liquid/Freezing/Frezen)	Freezing/ Frozen	Freezing/ Frozen	Freezing/ Frozen		Freezing/ Frozen		Freezing/ Frozen		Freezing/ Frozen		Freezing/ Frozen	
Cloud Ceiling (hundreds of feet in bs: Low/Mid/High in forecast)			Low/Mid/High		Low/Mid/High		Snow Accumulation Category (24-k period from 06Z each day)												
isibility (Statute Miles)			++/+/0/-/		++/+ / 0 / -/		T-Storms (reported within provious 12 kes)	Yes / No	Yes / No	Yes / No		Yes / No		Yes / No		Yes / No		Yes / No	
Surface Wind Direction (Degrees)							Severe WX (within 2" latitude of station)	Flood/ Wind/	Flood/ Wind/	Flood/ Wind/		Flood/ Wind/		Flood/ Wind/		Flood/ Wind/		Flood/ Wind/	
urface Wind Speed (kt)			++/+ / 0 / -/		++/+ / 0 / -/		Irrestered within previous 12-hl	Tornado/	Tornado/	Tomado/		Tornado/		Tornado/		Tornado/		Tornado/	
bserved Weather (1 hr either side)							Synoptic Frontal/Trof Passage	Hail	Hail	Hail		Hail		Hail		Hail		Hail	+
recipitation (within last 12 hours)			0 /+/++		0 /+/++		(Type / Time)**	ŗ		1		/		/		1			
recipitation Type (Lig. Freez, Froz)			• • • • • •		• • • • •			1	7	/		1		1		1		7	
rontal Passage (Type / Time; second	/	/	/		/		Totals:			00Z Total		12Z Total		00Z Totai		12Z Total		00Z Total	
ne in case there are two)	7	7	· /	1	· /		* Model Severe Criteria: 1) FOUS LI <	A and OPP	7 > 0.02 form	art by FOU	S or MO	S- and/or	2) 3 40	S Savara Ti		rm Probabi	16- > 5004	h and OPF	<u>> 0 0</u>

Fig. 2. Sample city forecast worksheet (fall, left; spring, right).

Successes

Contact time gives in-depth insights into student strengths/weaknesses



Successes (-cont.)

Approach consistent with research characterizing traits of competent forecasters (Pliske et al. 2004)

Challenges

- Capstone developed in era when NWP wasn't as accurate as today
- Increasing emphasis on integrated decision support and interpretation of ensemble-based and mediumrange guidance will require incorporation of these topics
- Challenge is to preserve best parts while adapting to changes taking place in operational environment References

Blackwell, K. G., 2011: The synoptic meteorology capstone course sequence in the USA meteorology major: A unique and highly successful approach to producing well-rounded and operationally competent meteorologists. First Annual South Alabama Conference on Teaching and Learning, University of South Alabama, Mobile, AL, 16 May 2011.

Pliske, R. M., B. Crandall, and G. Klein, 2004: Competence in Weather Forecasting. *Psychological* Investigations of Competence in Decision Making, 40-70.