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High School Core Course Grade Point Average as a Predictor of Undergraduate Academic Success

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ABSTRACT

The high school core course grade point average of a first-time-college undergraduate student admitted to a Midwestern research university might be used to predict that student's academic success. The performance of this predictor is compared to that of other possible predictors.



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Outline

- UM FTC Undergraduate Automatic Admission Policy
- Dr. Joe Saupe's solution to the problem of Missing HSPRNK's in the Standard Policy
- Proposed new approach for developing a new Standard Policy which uses HSCCGPA and ACTCOM only. (This approach is based on predicting student success.)
- Summary
- Next Steps
- Q & A



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UM FTC Undergraduate Automatic Admission Policy

- UM **Standard** Admission Policy
 1. UM-Required HS Core,
 2. ACT, and
 3. *either* **ACTCOM** ≥ 24
or **ACTCOM**%ile + **HSPRNK** ≥ 120

- UM **Enhanced** Admission Policy (Fall 2006 FTC and later)
 1. MO high school,
 2. UM-Required HS Core,
 3. ACT, and
 4. *either* **HSPRNK** ≥ 90 *if HS ranks its graduates*
or **HSCCGPA** ≥ 3.5 *if HS does not rank its graduates*



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“120 Rule” re-stated: $ACTCOM\%ile + HSPRNK \geq 120$

<u>ACTCOM</u>	<u>ACTCOM%ile</u>	<u>HSPRNK \geq</u>
≥ 34	100	20
33	99	21
32	98	22
31	97	23
	96	24
30	95	25
	94	26
29	93	27
...
17	28	92
	27	93
	26	94
	25	95
	24	96
	23	97
16	22	98
	21	99
	20	100



UM FTC Undergrad Automatic Admission — Restated

- UM **Standard** Admission Policy

1. UM-Required HS Core,
2. ACT, and
3. **ACTCOM** ACTCOM%ile HSPRNK >=

>= 24	Auto. Admissible	
23	68	52
22	62	58
21	55	65
20	48	72
19	41	79
18	35	85
17	28	92
16	22	98
<= 15	Not Auto. Admissible	

- UM **Enhanced** Admission Policy (FTC Fall 2006 and later)

1. MO high school,
2. UM-Required HS Core,
3. ACT, and
4. **either** **HSPRNK** >= 90 *if HS ranks its graduates*
or **HSCCGPA** >= 3.5 *if HS does not rank its graduates*



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UM FTC Undergraduates with Missing **HSPRNK**

Fall Semester	Class Size	HSPRNK Missing	
		N	%
2004	6,087	560	9.2
2005	6,455	728	11.3
2006	6,478	809	12.5
2007	6,546	936	14.3
2008	7,694	1,333	17.3
2009	7,675	1,499	19.5
2010	8,418	1,886	22.4

Full-time, degree-seeking, FTC UM undergraduates who recently completed secondary education. Excludes GED, home-schooled, non-resident alien, and transfer students. All four UM campuses.

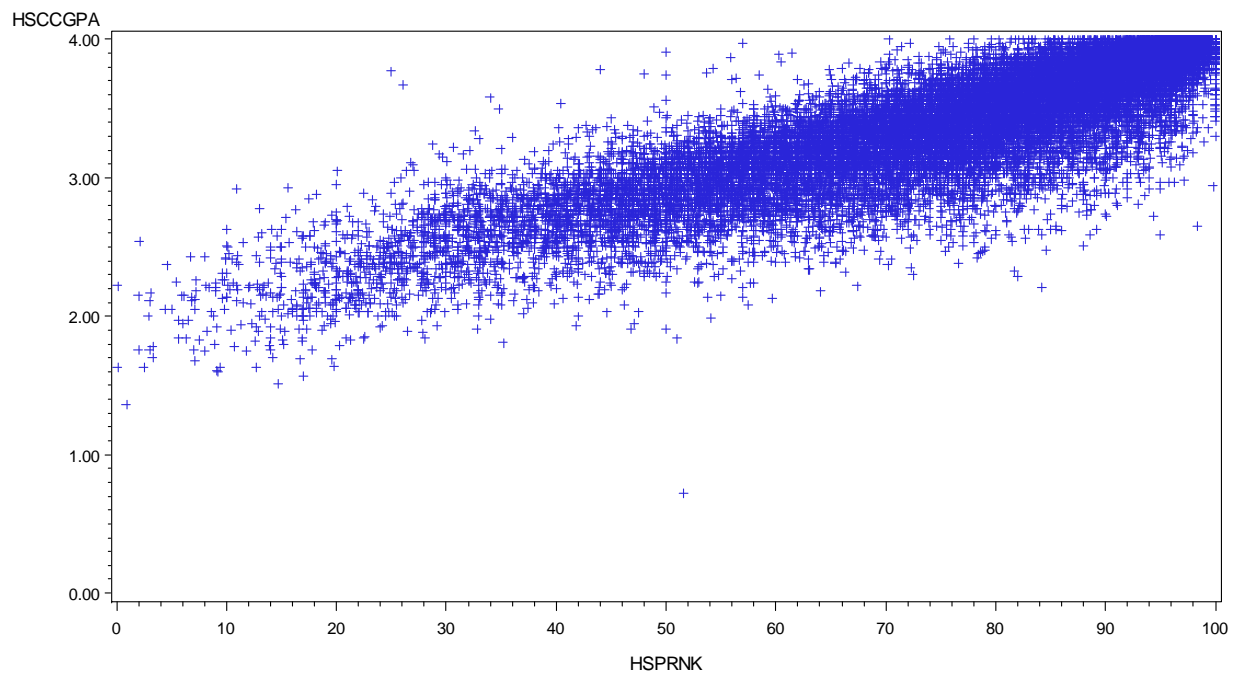


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Dr. Joe Saupe Solution to Missing HSPRNK (c. 2002)

1. Observed strong linear correlation between **HSPRNK** and **HSCCGPA**.



Fall 2006 through Fall 2010 full-time, degree-seeking, FTC UM undergraduates who recently completed secondary education and have ACT Composite Score, HS Class Percentile Rank, and HS Core Course GPA. Excludes GED, home-schooled, non-resident alien, and transfer students. Excludes students who took *only* the SAT. All four UM campuses.



Dr. Joe Saupe Solution to Missing HSPRNK (c. 2002)

1. Observed strong linear correlation between **HSPRNK** and **HSCCGPA**.

Correlation between **HSPRNK** and **HSCCGPA**.

Fall Semester	N	Pearson		Spearman	
		r	OSL	r	OSL
2006	4,636	0.86	< 0.0001	0.87	< 0.0001
2007	4,574	0.87	< 0.0001	0.88	< 0.0001
2008	5,215	0.88	< 0.0001	0.88	< 0.0001
2009	5,085	0.87	< 0.0001	0.88	< 0.0001
2010	5,395	0.87	< 0.0001	0.87	< 0.0001
ALL	24,905	0.87	< 0.0001	0.87	< 0.0001

Full-time, degree-seeking, FTC UM undergraduates who recently completed secondary education and have ACT Composite Score, HS Class Percentile Rank, and HS Core Course GPA. Excludes GED, home-schooled, non-resident alien, and transfer students. Excludes students who took *only* the SAT. All four UM campuses.



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Dr. Joe Saupe Solution to Missing HSPRNK (c. 2002)

1. Observed strong linear correlation between **HSPRNK** and **HSCCGPA**.

2. Proposed:
 - a. Use **HSCCGPA** (and **ACTCOM**) when no **HSPRNK**, and

 - b. Using recent FTC populations, derive **HSCCGPA cut-off value** (for a given **ACTCOM**) to yield *same percentage of Auto Admits* as yielded by **HSPRNK cut-off value**.



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Dr. Joe Saupe Solution to Missing HSPRNK (c. 2002)

UM Admissions Matrix with "legacy" HS Core Course GPA sliding scale.

		HSPRNK			HSCCGPA	
ACT Score	No. Students	Critical Value	Percent Admissible		Critical Value (preliminary)	Percent Admissible
>= 24	7,598		100.0%			100.0%
23	1,033	48	85.8%	14.2%	2.68	86.5%
22	829	54	82.4%	17.6%	2.84	82.9%
21	629	62	72.8%	27.2%	2.93	73.8%
20	452	69	61.9%	38.1%	3.05	64.8%
19	263	78	34.6%	65.4%	3.28	37.6%
18	142	86	25.4%	74.6%	3.37	26.8%
17	64	94	6.3%	93.7%	3.65	7.8%
<= 16	62		0.0%			0.0%
TOTAL	11,072		90.6%			91.0%

Fall 2000 (N = 5,573) & 2001 (N = 5,499) full-time, degree-seeking, FTC UM undergraduates who have ACT Composite Score (or SAT equiv.), HS Class Percentile Rank, and HS Core Course GPA. Excludes transfer students.



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Dr. Joe Saupe Solution to Missing HSPRNK (c. 2002) Update (Dr. R.D. Thompson, Aug 13, 2009)

UM Admissions Matrix with updated HS Core Course GPA sliding scale.

		HSPRNK			HSCCGPA	
ACT Score	No. Students	Critical Value	Percent Admissible		Critical Value (preliminary)	Percent Admissible
>= 24	10,426		100.0%			100.0%
23	1,365	48	82.9%	17.1%	2.80	83.3%
22	1,216	54	80.9%	19.1%	2.92	80.9%
21	852	62	68.9%	31.1%	3.05	69.3%
20	587	69	62.7%	37.3%	3.18	63.4%
19	335	78	44.2%	55.8%	3.35	44.5%
18	183	86	29.5%	70.5%	3.47	29.5%
17	101	94	11.9%	88.1%	3.63	11.9%
<= 16	72		0.0%			0.0%
TOTAL	15,137		90.6%			90.7%

Fall 2006 (N = 4,826), 2007 (N = 4,891), and 2008 (N = 5,420) full-time, degree-seeking, FTC UM undergraduates who (1) satisfy the UM admission requirement for HS core courses, and (2) have ACT Composite Score (or SAT equiv.), HS Class Percentile Rank, and HS Core Course GPA. Excludes GED, home-schooled, non-resident alien, and transfer students.

ThompsonRD: HS Core Course GPA as a Predictor of Undergraduate Academic Success
Mid-America Association for Institutional Research (MidAIR)
30th Annual Conference
November 10-12, 2010
MidAIRTalk_20101111_SaupeSolution05



RDT's Concerns & Considerations:

1. (ACTCOM & HSPRNK) and (ACTCOM & HSCCGPA) can disagree!

Admissibility Agreement/Disagreement between (ACTCOM & HSPRNK) and (ACTCOM & HSCCGPA)

Fall Semester	N	Agree		Disagree	
		N	%	N	%
2006	4,636	4,354	93.9	282	6.1
2007	4,574	4,327	94.6	247	5.4
2008	5,215	4,931	94.6	284	5.4
2009	5,085	4,850	95.4	235	4.6
2010	5,395	5,137	95.2	258	4.8
ALL	24,905	23,599	94.8	1,306	5.2

Full-time, degree-seeking, FTC UM undergraduates who recently completed secondary education and have ACT Composite Score, HS Class Percentile Rank, and HS Core Course GPA. Excludes GED, home-schooled, non-resident alien, and transfer students. Excludes students who took *only* the SAT. All four UM campuses.

2. HSCCGPA *possibly* is a better predictor of academic success than HSPRNK.



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RDT's Approach: Overview

1. Propose new UM Std Auto Admission Policy based on **HSCCGPA** (and **ACTCOM**) .
2. Base this new Policy on student success.
3. Use Logistic Regression applied to recent FTC populations to derive **HSCCGPA** critical values.



RDT's Approach: Details

- Defn of Success: *Either* SP Cum GPA ≥ 2.0
or FS Cum GPA ≥ 2.0 *if not enrolled for SP*

- Sample:

Sample for Logistic Regression

Fall Semester	N	1st-Year Success	
		N	%
2007	4,048	3,584	88.5
2008	4,757	4,223	88.8
ALL	8,805	7,807	88.7

Full-time, degree-seeking, FTC UM undergraduates who recently completed secondary education and have ACT Composite Score, HS Class Percentile Rank, and HS Core Course GPA. Excludes GED, home-schooled, non-resident alien, and transfer students. Excludes students who took *only* the SAT. **Three UM campuses only.** (UM_2 is excluded for this preliminary investigation.)

- 1st-Order Linear Logistic Regression with **1st-Year Success** regressed on **ACTCOM**, **HSCCGPA**, and **HSPRNK**.



RDT's Approach: Results

1. 1st-Order Linear Logistic Regression with 1st-Year Success regressed on ACTCOM, HSCCGPA, and HSPRNK:

MODEL **iSUCCESSFUL** = **HSCCGPA** **ACTCOM** **HSPRNK**

- Model is highly significant (OSL < 0.0001).
- **HSPRNK** adds nothing *additionally* (OSL = 0.0691)

2. 1st-Order Linear Logistic Regression with 1st-Year Success regressed on ACTCOM and HSCCGPA:

MODEL **iSUCCESSFUL** = **HSCCGPA** **ACTCOM**

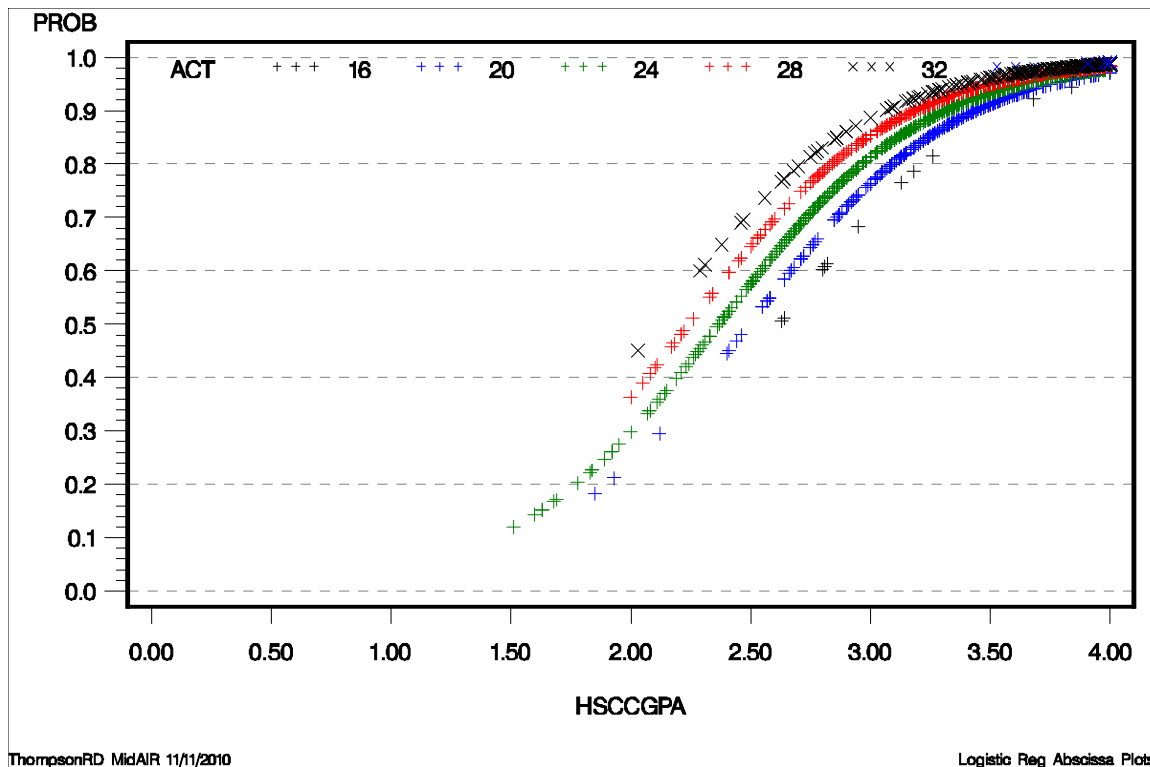
- Model is highly significant (OSL < 0.0001).
- Both **HSCCGPA** and **ACTCOM** are critical (all OSL's < 0.0001)
- Estimate of intercept = -7.2669
- Estimate of coeff of **HSCCGPA** = 2.3249
- Estimate of coeff of **ACTCOM** = 0.0734



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RDT's Approach: Results (continued)



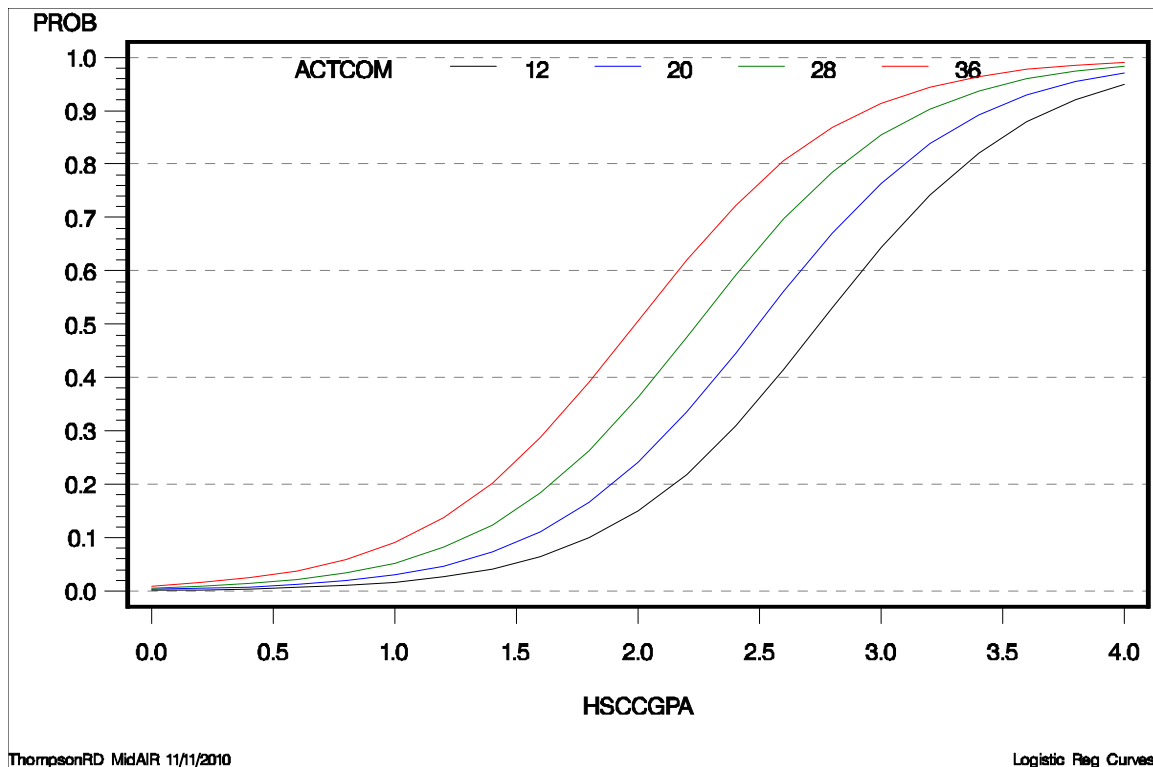
Fall 2007 and Fall 2008 full-time, degree-seeking, FTC UM undergraduates who recently completed secondary education and have ACT Composite Score, HS Class Percentile Rank, and HS Core Course GPA. Excludes GED, home-schooled, non-resident alien, and transfer students. Excludes students who took *only* the SAT. **Three UM campuses only.** (UM_2 is excluded for this preliminary investigation.)



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RDT's Approach: Results (continued)



Fall 2007 and Fall 2008 full-time, degree-seeking, FTC UM undergraduates who recently completed secondary education and have ACT Composite Score, HS Class Percentile Rank, and HS Core Course GPA. Excludes GED, home-schooled, non-resident alien, and transfer students. Excludes students who took *only* the SAT. **Three UM campuses only.** (UM_2 is excluded for this preliminary investigation.)



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Success of Admissible Students

(Using UM Std Admission Policy restated - legacy)

ACTCOM	N	No. Admiss.	1st-Year Success	
			N	%
>= 24	6,185	6,185	5,618	90.8
23	813	686	599	87.3
22	703	573	508	88.7
21	484	333	292	87.7
20	322	211	178	84.4
19	164	68	57	83.8
18	91	26	21	80.8
17	26	5	3	60.0
<= 16	17	0		
TOTAL	8,805	8,087		

Fall 2007 and 2008 full-time, degree-seeking, FTC UM undergraduates who recently completed secondary education and have ACT Composite Score, HS Class Percentile Rank, and HS Core Course GPA. Excludes GED, home-schooled, non-resident alien, and transfer students. Excludes students who took *only* the SAT. **Three UM campuses only.** (UM_2 is excluded during these preliminary tests.)



RDT's Approach: Results

- Specify **HSCCGPA critical values** so that a student who has a given **HSCCGPA** and a given **ACTCOM**, has **probability 90% (say)** of being successful, *AOTBE*.

ACTCOM	Prob of Success (est.)	HSCCGPA Critical Value (prelim.)
>= 24		N/A
23	0.90	2.81
22	0.90	2.84
21	0.90	2.87
20	0.90	2.90
19	0.90	2.94
18	0.90	2.97
17	0.90	3.00
16	0.90	3.03
15	0.90	3.06
14	0.90	3.09

13	0.90	3.13
12	0.90	3.16
11	0.90	3.19
10	0.90	3.22
9	0.90	3.25
8	0.90	3.28
7	0.90	3.32
6	0.90	3.35
5	0.90	3.38
4	0.90	3.41
3	0.90	3.44
2	0.90	3.47
1	0.90	3.50



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RDT's Approach: Performance

ACT	Prob of Success (est.)	HS CC GPA Critical Value (prelim.)	Class Size Fall 2009 FTC	Admissible by RDT's HSCCGP & ACTCOM Rule		
				N	1st-Year Success	
					N	%
>= 24		N/A	3,320	3,320	3,007	90.6
23	0.90	2.81	424	350	313	89.4
22	0.90	2.84	318	276	248	89.9
21	0.90	2.87	238	194	176	90.7
20	0.90	2.90	141	113	98	86.7
19	0.90	2.94	82	67	55	82.1
18	0.90	2.97	30	22	17	77.3
17	0.90	3.00	20	14	10	71.4
16	0.90	3.03	7	3	1	33.3
15	0.90	3.06	3	2	1	50.0
14	0.90	3.09	1	1	0	0.0
13	0.90	3.13	2	1	1	100.0
TOTAL			4,586	4,363	3,927	90.0

Fall 2009 full-time, degree-seeking, FTC UM undergraduates who recently completed secondary education and have ACT Composite Score, HS Class Percentile Rank, and HS Core Course GPA. Excludes GED, home-schooled, non-resident alien, and transfer students. Excludes students who took *only* the SAT. **Three UM campuses only.** (UM_2 is excluded for this preliminary investigation.)

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 MidAIRTalk_20101111_RDTApproachPerformance



Proposed New UM FTC Undergrad Automatic Admission Policy (Based on preliminary research)

- UM **Standard** Admission Policy

1. UM-Required HS Core,
2. ACT, and
3. ACTCOM HSCCGPA \geq

≥ 24 Auto. Admissible

(Insert RDT result here)

≤ 16 ~~Not Auto. Admissible~~

- UM **Enhanced** Admission Policy (FTC Fall 2006 and later)

1. MO high school,
2. UM-Required HS Core,
3. ACT, and
4. *either* HSPRNK ≥ 90 *if HS ranks its graduates*
or HSCCGPA ≥ 3.5 *if HS does not rank its graduates*



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Next Steps

1. Include 4th UM campus.
2. Include additional FTC cohort(s), e.g., Fall 2006 and/or Fall 2009.
3. Reconsider “Success.”
4. Investigate model further:
 - Fit, goodness, etc.
 - Look again at [HSPRNK](#).
 - 1st-order interaction, or 2nd-order model.
 - Longitudinal effect.
 - Campus effect.
5. Incorporate uncertainty when specifying [HSCCGPA critical values](#).
Use
 - *either* confidence limits
 - *or* highest posterior density interval limits
6. Investigate robustness of results regarding FTC students who:
 - did not complete HS Core.
 - did not recently complete secondary education.
 - did not take ACT (i.e, who took only the SAT).

7. Discuss implications/practicability of results with UM campus enrollment managers, admissions directors, and registrars.
8. Discuss policy issues with UM System Academic Affairs and campus provosts.



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Summary

- Described UM FTC Undergraduate Automatic Admission Policy.
- Described the problem of Missing **HSPRNK**'s regarding Standard Policy.
- Described Dr. Joe Saupe's solution to the problem of Missing **HSPRNK**'s in the Standard Policy, and discussed some concerns.
- Described an approach (based on predicting student success using only **HSCCGPA** and **ACTCOM**) that can lead to a new Standard Policy, which doesn't lead to the same concerns. This approach uses logistic regression. **HSPRNK** was shown to add no additional value when predicting student success.
- Proposed a new *preliminary* Standard Policy based on *preliminary* research.
- Listed the next logical steps in this on-going research.