

Toward a More Equitable and Effective Physics Graduate Admissions Process

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Graduate school is a popular choice for physics majors

Post-Graduation Plans versus Actual Outcomes for Physics and Astronomy Seniors, Class of 2021



▲AIP

aip.org/statistics



Larger admissions context



AIP Statistics; Young, Hayward, and Bell (2023)



Larger admissions context



AIP Statistics; Young, Hayward, and Bell (2023)



Larger context: Physics lags behind other STEM fields in terms of representation



Source: IPEDS and APS



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What's inequitable with the way we've always done it?



The typical admissions package

GRE scores	
GPA	
Personal statement	,
Research statement	,
Letters of	
recommendation	,
	,
	/



The typical admissions package







Research Goal: Determine which application components are most predictive of an applicant being admitted to a physics graduate program.

Young and Caballero (2019); Young et al. (2023)









Michigan State University 2014-2017



Hypothetical Example: Do you attend an 8am conference session?



Breiman 2001 Strobl et al. 2007 Janitza et al. 2013



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Test scores & GPA are most predictive of admission





Why the Physics GRE is inequitable







Cost

Score discrepancies

Limited predictive ability

Miller et al. 2019, Owens et al. 2020



What would it look like to rethink graduate admissions and make it more equitable?

Young et al. 2022



Rubric-based holistic review

Kent and McCarthy 2016; Posselt 2016; Miller & Posselt 2020



Rubric-based holistic review



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Miller 2015; Barceló et al 2021; Woo et al 2022



		Research (25%) variety/duration			
Academic Preparation (25%)	Physics Coursework				
	Thysics Coursework	quality of work			
				technical skills	
	Math Coursework				
				dispositions	
	Other Coursework	1			
	Academic honors and/or		Fit with program (15%)	research	
	recognitions				
				faculty	
Non-Cognitive Competencies (25%)	Achievement Orientation				
				community	
	Conscientiousness				
				diversity	
	Initiative				
	Perserverence		GRE Scores (10%) General GRE		
				Physics GRE	

https://igenetwork.org/



			Research (25%)	variety/duration		
Academic Preparation (25%)	Physics Coursework					
				quality of work		
				technical skills		
	Math Coursework					
	Other Coursework			dispositions		
	Other Coursework					
	Academic honors and/or		Fit with program (15%)	research		
recognitions years						
321 Rated Domestic Applicants						
			•••	community		
	Conscientiousness					
				di se estito		
	Initiative			diversity		
	Perserverence		GRE Scores (10%)	General GRE		
				Physics GRE		

https://igenetwork.org/



	All Rated Applicants (N=321)				
ы С	Physics Coursework -	0	•	•	-
emi	Math Coursework-	•	•	•	-
cad epa	All Other Coursework-	0	•	•	
٩ŗ	Academic Honors-	•	0	•	-
Ļ	Variety/Duration of Research-	0	•	•	Fraction
arc	Quality of work-	0	•	•	0.8
ese	Technical Skills-	0	•	•	0.6
£	Research Dispositions-	0	•	•	0.4
es es	Achievement Orientation-	0			O 0.2
nitiv	Conscientiousness-	Ő			0.0
cog		ŏ			
-uo	Perseverance-				Fraction
Ζō	r crocvorance				0.6
<u> </u>	Alignment of Research-	0	•	•	- 0.6
with grar	Alignment with Faculty-	0	•	•	- 0.4
Fit pro(Community contributions -	0	•	•	0.2
	Diversity contributions -	•	•	•	0.0
scores	General GRE Scores-	0	•	•	-
GRE :	Physics GRE Score-		•	•	-
		Low	Medium	High	

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Applicants spread between the rubric levels





Applicants concentrated in the "medium" and "high" categories



Admitted applicants tend to score "high"... Rejected applicants tend to score "medium"





What about equity???



The only differences in ratings between males & females were on physics GRE scores and service/diversity work.



Miller et al. 2019; Guarino & Borden 2017



Test scores are the only consistent difference



Mikkelsen, Young, Caballero 2021



Takeaway

Rubric-based holistic review seems promising for achieving equity in graduate admissions.



But is really a different process?



The evidence suggests that rubric-based holistic admissions is a change from the traditional admissions process...



The evidence suggests that rubric-based holistic admissions is a change from the traditional admissions process...

but there's still some work to do to be confident in that conclusion.



Takeaways

• The traditional graduate admissions process in physics is test score and GPA heavy.



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- Test scores and GPA can be inequitable for minoritized applicants



Takeaways

- The traditional graduate admissions process in physics is test score and GPA heavy.
- Test scores and GPA can be inequitable for minoritized applicants
- Rubric-based holistic review seems promising for achieving equity in graduate admissions.



• Discontinue the use of the physics GRE

Owens et al 2020



- Discontinue the use of the physics GRE
- Rethink the admissions process in terms of what applicants are evaluated on, how they are evaluated, and who is doing the evaluating

View the Michigan State Rubric:

Rubric-based holistic review: A promising route to equitable graduate admissions in physics (Young et al 2022)



- Discontinue the use of the physics GRE
- Rethink the admissions process in terms of what applicants are evaluated on, how they are evaluated, and who is doing the evaluating
- Engage in self-study and report on what is and is not working

Scherr et al 2017; Rudolph et al 2020



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Questions?

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Slides:

https://bit.ly/young_damop_2024

Scherr et al 2017; Rudolph et al 2020



Recommended reading

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