



INDIANA UNIVERSITY

**OFFICE OF THE VICE PROVOST
FOR UNDERGRADUATE EDUCATION**

Bloomington

INTELLIGENT SYSTEMS ENGINEERING

PROGRESS REPORT

PRESENTERS

EMMA CRADY, LUKE HOCHGESANG, NATE MEYERS, TIFFANY XIE

“On rare occasions, you have an opportunity to blaze a new trail—to take part in something so original that you’ll look back 5, 10, 20 years from now and marvel at what you did.”

This is one of those occasions.

April 13, 2017

INTELLIGENT SYSTEMS ENGINEERING (ISE) PRESENTS AN EXCITING, NEW OPPORTUNITY

- **We are personally thrilled to see this opportunity at Indiana University**
 - Our backgrounds are diverse across the University
 - Kelley, College of Arts and Sciences
 - At IU, students are encouraged to take courses outside of their major
- **We are excited to see students with varied interests take advantage of this innovative program**
 - This is truly an opportunity for interdisciplinary exploration



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ISE IS AT A PIVOTAL POINT IN ITS HISTORY

- **Background and History**

- IU was only university out of 62 AAU universities without an Engineering program
- Program began Fall 2016, such that first ISE graduates will align with Bicentennial

- **ISE has many opportunities to accelerate program success and development**

- "Renaissance" Engineering and unique concentrations aim to prepare students for growing field of engineering
 - Cyberphysical Systems; Nanoscale Engineering
 - *Engineering for the 21st Century*
- Rigorous program (with high credit hour requirements) may hold students back



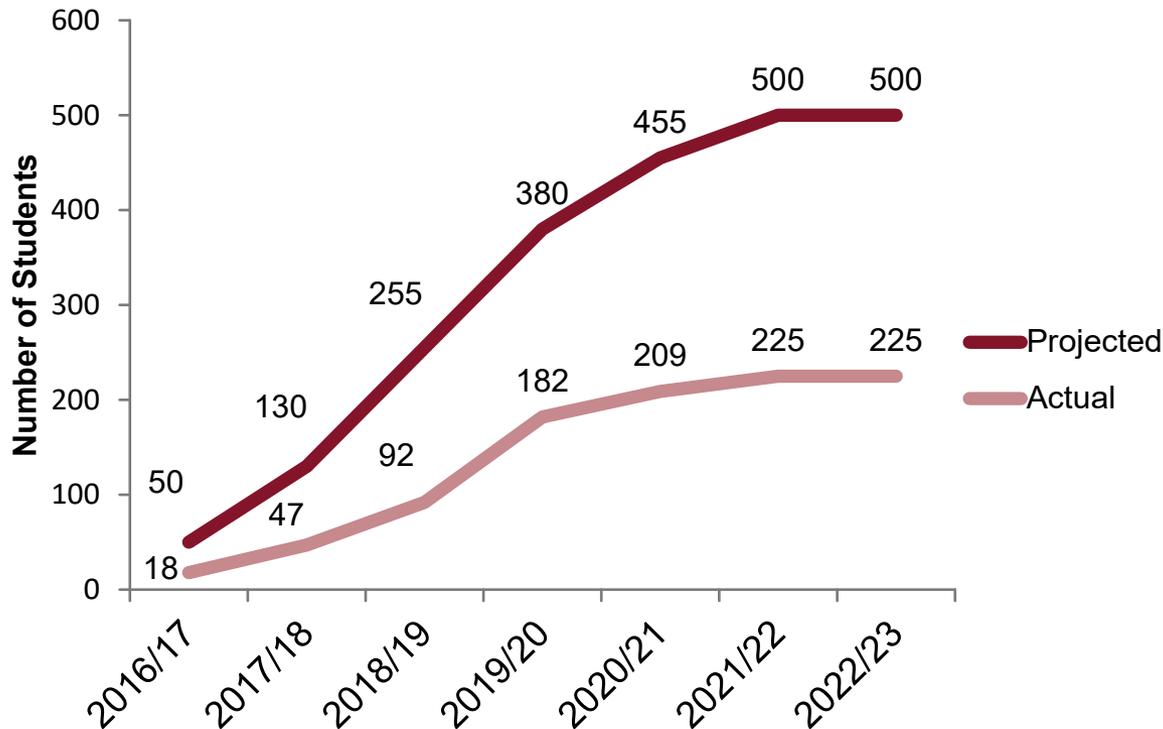
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ISE DEMONSTRATES ROOM FOR IMPROVEMENT IN MEETING ENROLLMENT/RETENTION TARGETS

ISE Student Enrollment



*The actual student enrollment was calculated using the same ratio as that of projected enrollment

Complications

- Fewer students enrolled than expected
 - 25 students as of Fall 2016, 18 students as of Spring 2017
- Great program that needs increased awareness

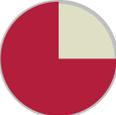
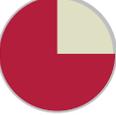
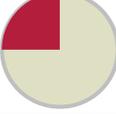


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A MINOR IN ISE WILL PROVIDE THE GREATEST IMPACT OUT OF ALL POTENTIAL IMPROVEMENTS

		Recommendations			
		Tie Up Major Curriculum	Introduction of Pre-Med Path	Enhanced Marketing Video (Student) + Pamphlet (Parents)	ISE Minor
Poor    Good  					
Objectives	Feasible?				
	Increased Student Interest?				
	Fulfillment of SOIC's Goals? Education/Research, Econ Dev/Entrepreneurship, Diversity				
	Alignment with IU's Goals? Providing holistic college experience				
	Competitive Edge? Utilization of strong programs				

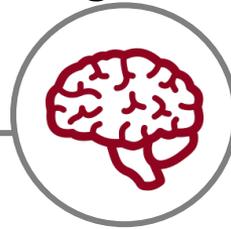
AN ISE MINOR PROVIDES HOLISTIC BENEFIT

Operationally Feasible



- An ISE minor appeals to all stakeholders
- OVPUE can change course curriculum for the minor
- 10 Big 10 schools currently have engineering minors, potential models for us

Interesting to Students



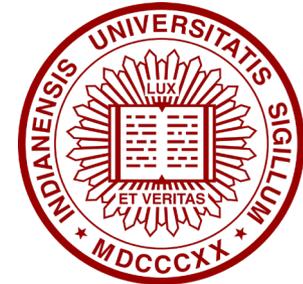
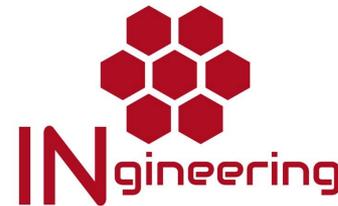
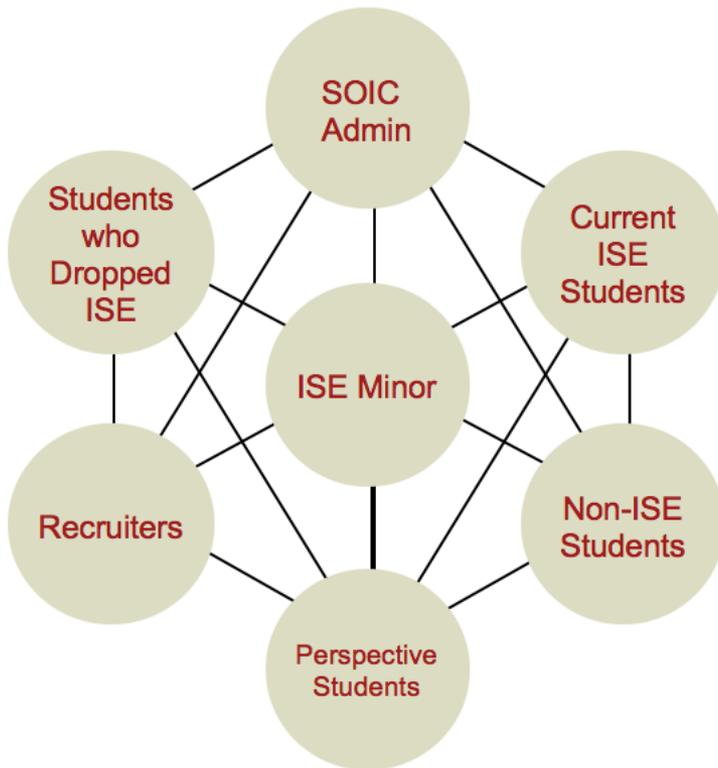
- An ISE minor aligns with current trends in the STEM field
- Minor students will create buzz and validity for the program in the short-term
- Long-term increase in enrollment/retention

Strategic Long-Term



- Increases interdisciplinary interactions
- STEM attracts high-value students (Master's & Int'l.)
- IU possesses competitive advantages against other schools

A MINOR APPEALS TO ALL STAKEHOLDERS



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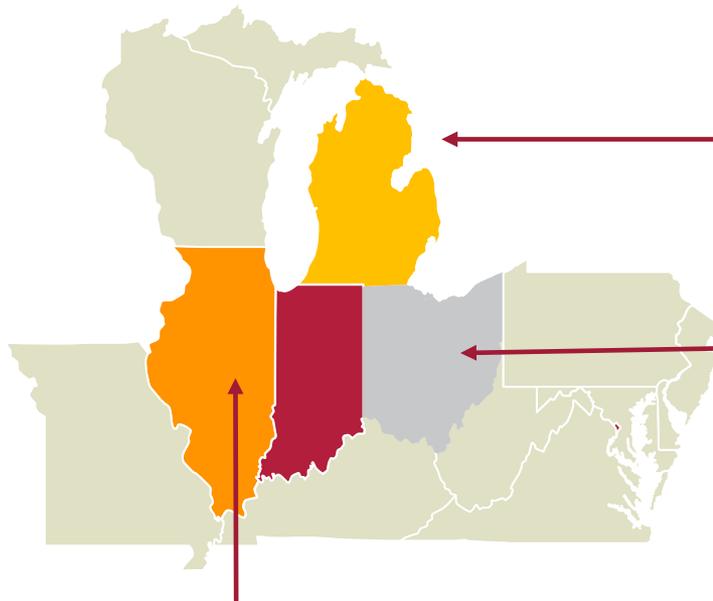
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Feasibility

Enrollment Increase

Strategic Long-Term

BENCHMARK BIG TEN INSTITUTIONS OFFER MINORS IN ENGINEERING



University of Michigan offers an Interdisciplinary Engineering Minor through the College of Engineering.

Ohio State University's College of Engineering offers a wide variety of minors in engineering, ranging from Humanitarian Engineering to Biomedical.

The University of Illinois at Urbana Champaign also offers a Minor programming, with minors ranging from international Engineering to electrical.



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Feasibility

Enrollment Increase

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ISE MINOR FULFILLS GROWING DEMAND FOR STEM EDUCATION

Job Market Demand for STEM Degrees

- Over 5.7 Million Job openings in 2013 in STEM related fields, many of which will go unfilled.
- In the last decade, STEM job growth has outpaced other fields 3-1.
- From 2008 to 2018, STEM jobs are expected to grow ~17%

Student Demand for STEM programs

- Amongst international students in the US, Engineering is the most popular major ~ 21%.
- Just under a third of incoming college students intend on majoring in STEM related field.

Rise of Renaissance Engineering

- The Engineer of 2020: Visions of Engineering in the New Century – National Academy of Engineering

Feasibility

Enrollment Increase

Strategic Long-Term



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INTERDISCIPLINARY COLLABORATION BETWEEN ISE AND OTHER IU MAJORS WOULD BE ATTRACTIVE TO STUDENTS

Non-Pre-Med Biologist

- Science student looking for less traditional experience
- May be better prepared to enter field of prosthetics or biotechnology

Future Oil Executive

- Geology students looking to enter the oil or natural gas industry would benefit from an introduction to engineering

The Scientific Artist

- Digital arts students may look to understand alternative media
- Computational understanding will prepare students for variety of artistic applications

The Tech-Conscious Teacher

- Secondary Education Science student may want to take skills learned in ISE and teach them to her students

Feasibility

Enrollment Increase

Strategic Long-Term



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IN THE LONG-TERM, A MINOR WOULD INCREASE STUDENT ENROLLMENT AND RETENTION

■ Student Retention

- Some ISE students dropped the major due to course inflexibility (did not allow room for premedical or biology courses)
- A minor would allow these students to continue in the ISE program

■ Student Enrollment

- Minor program would reach students who want engineering and applied computing skills without committing to the full 60 credit schedule
- Increased number of students in ISE program



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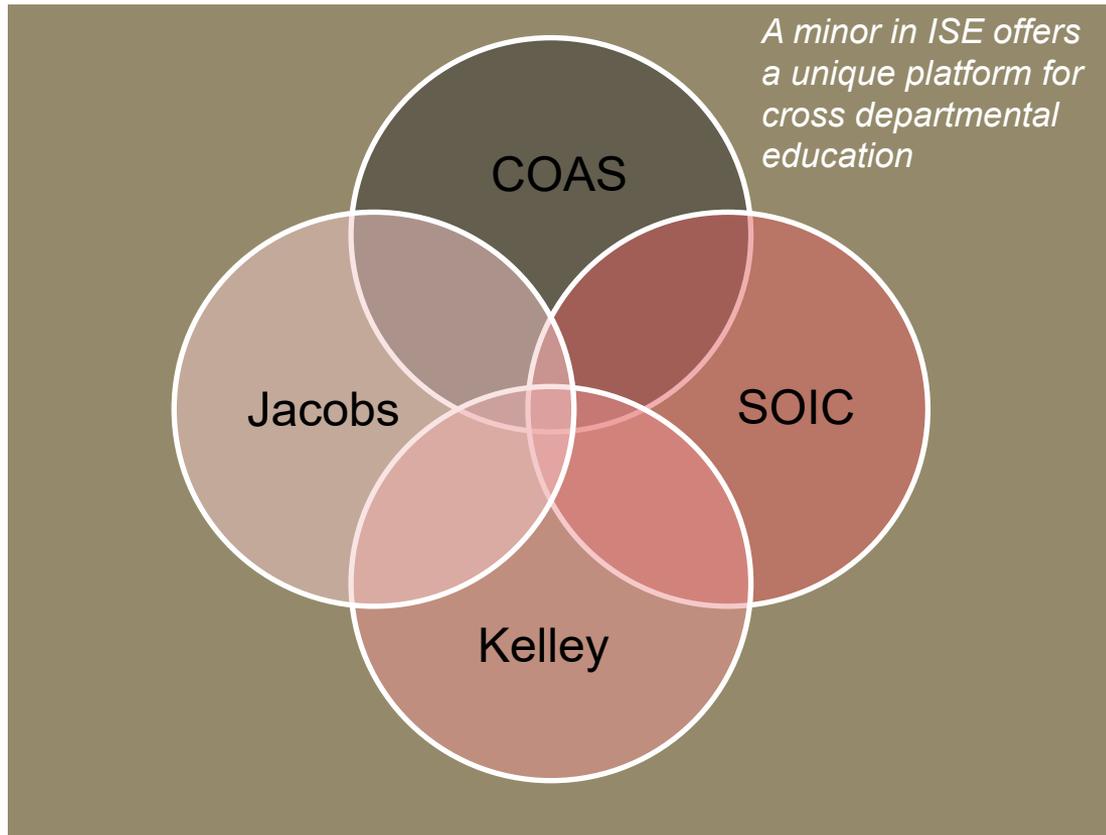
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Feasibility

Enrollment Increase

Strategic Long-Term

AN ISE MINOR PROMOTES INTERDISCIPLINARY INTERACTIONS AND COLLABORATIONS



Key Takeaways

- One of Indiana University Bloomington's most unique value proposition is the extreme breadth and quality of academic offerings, yet students often "Silo" themselves within academic concentration.
- Unique and diverse cohort of ISE minor students would best prepare students for post graduation employment opportunities.

Feasibility

Enrollment Increase

Strategic Long-Term

INCREASED OPPORTUNITY IN STEM-RELATED AREAS ATTRACTS HIGH-VALUE STUDENTS.

International Students

- A minor program would attract international students interested in STEM programs
- Studies have shown that international students are more interested in STEM than domestic students

Master's Students

- Students can use an ISE minor as a path to the ISE graduate program
- Minor program becomes a feeder into the master's program
- Students who are familiar with program realize this is something they want to pursue

Feasibility

Enrollment Increase

Strategic Long-Term



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AN ISE MINOR CAPITALIZES ON INDIANA'S COMPETITIVE ADVANTAGES

1 Minor Programs (IU's Related Area)



Architectural IU: Master's in Architecture	X		X
Bioengineering IU: College of Arts & Sciences		X	
City & Regional Planning IU: School of Public & Environmental Affairs			X
Computer IU: School of Informatics and Computing	X	X	X
Environmental & Ecological IU: School of Public & Environmental Affairs	X		X
Engineering & Public Policy IU: SPEA/Kelley	X		X
IP Law for Engineers IU: Maurer School of Law	X		
Global Engineering Studies IU: School of Global & International Studies	X	X	
Sustainable Engineering IU: School of Public & Environmental Affairs	X		
Tech and Management IU: Kelley School of Business		X	
Fintech w/ Engineering IU: Kelley School of Business			

- 1 Indiana University possesses strong background in fields where top competitors play.
- 2 Compared to top competitors, ISE is pace-setting in the area of renaissance engineering.
- 3 Larger programs are termed as "pressure chambers" whereas IU provides a supportive, personalized experience.



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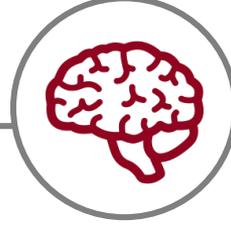
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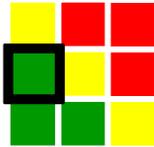
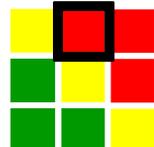
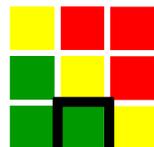
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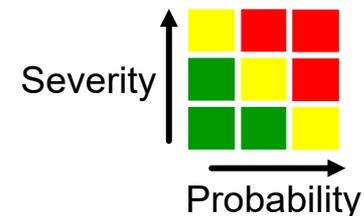


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AN ISE MINOR PRESENTS GREAT BENEFIT WITH MINIMAL RISKS

Risk	Degree	Mitigation
Slow Interest Build		Employ targeted marketing
Lack of Depth		Re-evaluate curriculum and choose the most valuable, uncorrelated courses
Internal Cannibalization		Once students are in the door, sell the ISE major hard

Feasibility Enrollment Increase Strategic Long-Term



OUR TEAM RECOMMENDS EXTENDING OUR ENGAGEMENT WITH THE ISE PROGRAM

- Future Objectives
 - Confirm (heavily) logic-based insights through data analysis
 - Assist in the creation of an ISE minor curriculum
 - Collect and analyze data on synergies between IU programs and ISE
 - Speak with all stakeholders about an ISE minor
- Additional Questions?

APPENDIX I: OPTIONS MATRIX EXPLANATION

Recommendations

<p>Poor Good</p> 	<p>Tie Up Major Curriculum</p>	<p>Introduction of Pre-Med Path</p>	<p>Enhanced Marketing Video (Student) + Pamphlet (Parents)</p>	<p>ISE Minor</p>
<p>Feasible?</p>	<p>This is feasible because there is a plan to do it in place.</p>	<p>From conversation with Nancy – this will be difficult.</p>	<p>This can be completed easily, but how effectively?</p>	<p>10 other B10 schools have similar programs, which can be modeled off of.</p>
<p>Increased Student Interest?</p>	<p>This is a hesitancy of students now but wouldn't attract anyone new</p>	<p>This is only focused on the pre-med majors; there could be a larger customer base</p>	<p>This will attract people, but they will still look into the program further</p>	<p>This attracts students from across campus and ones looking for STEM curriculum</p>
<p>Fulfillment of SOIC's Goals?</p>	<p>Meets education, entrepreneurship, and diversity goals</p>	<p>Meets education and diversity goals</p>	<p>Meets diversity goals by attracting diverse students</p>	<p>Education, Economic Development, and Diversity</p>
<p>Alignment with IU's Goals?</p>	<p>Providing a great educational experience, yet this is siloed</p>	<p>Interdisciplinary benefits realized – with focus on pre-med</p>	<p>This won't substantively influence a student's experience</p>	<p>Academic (+), Social (+) due to LLC, Professional (developing)</p>
<p>Competitive Edge?</p>	<p>One could double-major, but it would be extremely tough</p>	<p>Utilizes strong pre-med program</p>	<p>Interests more students who get a holistic experience</p>	<p>Utilizes an abundance of strong programs</p>

Objectives

APPENDIX II: COMPETITIVE ADVANTAGES

Renaissance Engineering

- ISE is hands-on, project-based learning
- Distinguishes ISE from traditional engineering schools
- Collaborative environment with inbuilt support system

Personalized Experience

- Because ISE is a smaller program in comparison to traditional engineering schools, students are big fish in a small pond
- ISE's inbuilt support system distinct from "weed-out" classes and sometimes impersonal environment of other schools



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