

# Central Indiana STEM Talent Expansion Program (CI-STEP): Transforming Education

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# NSF STEP

- “STEP seeks to increase the number of students (U.S. citizens or permanent residents) receiving **associate or baccalaureate degrees** in established or emerging fields within STEM.”
- “... STEP Type 1 activities should be aimed at adapting and implementing best practices that will lead to an increase in the number of students (U.S. citizens or permanent residents) obtaining STEM degrees.”
- “The goal of the project must be to **increase the total graduation numbers** of such students at the institution.”
- “The proposal must include specific numerical targets for these increases.”
- “A project cannot focus efforts to increase the graduation numbers at the expense of degrees in other STEM fields.”

# PRIORITIES

## Indiana

September 2011, state-wide priority set to improve college graduation rates.  
“Changes are needed, especially when it comes to remediation” Complete College America Senior VP Cheryl Orr

## IU

President McRobbie’s State of the University address on September 28, 2010 stated that one of the highest priorities of the university is to retain and graduate a higher percent of its students on all of the IU campuses.

## Nation

The President’s Council of Advisors on Science and Technology (PCAST) found in 2012 that economic forecasts point to a need for producing, over the next decade, approximately 1 million more college graduates in STEM fields than expected under current assumptions.

**Goals of CI-STEP is directly aligned with all of these priorities.**



# QUESTION

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- What is preventing us from graduating more STEM students?
- Are we doing enough to see the change that PCAST is calling for (1 million additional STEM graduates over 10 years)?

# IUPUI CI-STEP

- National Science Foundation, awarded September 2010, \$1.99 M
- “STEP seeks to increase the number of students receiving **associate or baccalaureate degrees** in established or emerging fields within STEM.”
- CI-STEP at IUPUI is creating a **central Indiana pipeline to increase the number of students obtaining STEM degrees of all demographic groups who:**
  - (1) pursue STEM academic and career pathways;
  - (2) participate in STEM research, internships, and honors activities;
  - (3) graduate with an undergraduate degree in STEM fields; and
  - (4) transition into industry, graduate and professional programs.
- “... STEP Type 1 activities should be aimed at **adapting and implementing best practices that will lead to an increase in the number of students (U.S. citizens or permanent residents) obtaining STEM degrees.**”

# IUPUI CI-STEP GOALS

Our proposal aims to 'set the stage' for student success, removing barriers to learning and promoting a vision of a career in STEM. As a result, *we are targeting for each year of the funding, a:*

- 10% ↑ in the number of new and transfer students admitted to STEM majors,
- 10% ↑ in the number of minority students admitted to STEM majors
- 10% ↓ in the DFW rates for MATH, CS, PHYS, TECH and other courses
- 15 additional students participating in internship and research experiences
- 50 graduating seniors participating in honors seminars

17 departments in the **School of Science** and **School of Engineering & Technology**

**Overall:** The program has set a target of increasing the number of STEM graduates at IUPUI by 10% per year -- an **additional 782 STEM graduates** by 2015, for a total of **3,067 STEM graduates by 2015.**

# MILESTONES

- As of last March (2011) a milestone was reached, **30.4%** of people over age 25 in the United States held at least a bachelor's degree, up from **26.2%** 10 years earlier.

- Census Bureau's annual Current Population Survey via New York Time Feb. 23<sup>rd</sup>, 2012

- Newly-formed Indiana College Completion Council has goal to raise Hoosiers with college credential to **60%** by 2025.

- Inside Indiana Business Feb 20<sup>th</sup>



# QUESTION

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- What are the benefits of timely graduation?
- What is IUPUI doing to reach this milestone?
- Is 60% too ambitious?



# THE TARGETED STEM DEPARTMENTS

STEM Program	F08 Direct Admits	F08 Transfers	F08 Total Majors	F08 Minorities	08-09 Graduates
Sci – Biol, Chem, Geol, Phys	386	46	885	223, 25%*	123
Tech – EE, CM, CP, ME, CI, BM	55	108	967	230, 28%^	184
Engr – EE, ME, CPE, BME, MS	102	91	808	285, 38%^	110
Math – MA, CS	48	15	223	42, 19%*	40
Total	591	260	2,883	780, 29%	457

\* Includes AA, Hisp/Latino, and Native American students, excludes Asians and females.

^ Includes AA, Hisp/Latino, Native American and female students, excludes Asians.

**Goal:** 10% increase each year from **457 in baseline** → **782 STEM graduates**

# PROFILE OF STUDENTS AND CHALLENGES FACING THE STEM TALENT GAP AT IUPUI

	IUPUI SoS	IUPUI SoET	IUPUI Total	IUBL
Hours employed	23.8 hr/wk	30.3 hr/wk	25.8 hr/wk	7.2 hr/wk
% of new students that are FT	83%	53%	69%	96%
% in top 10% of HS class	43.6%	28.8%	17.9%	31.2%
1-yr retention rate of FT/FT	79%	75%	68%	90%
6-yr graduation rate	45.9%	29%	32%	73%
Undergraduate degrees awarded to total number of undergrads in unit	163 / 1,108 (14.7%)	294 / 1,775 (16.6%)	3,356 / 21,423 <b>(15.7%)</b>	6,352 / 31,626 <b>(20.0%)</b>

**In 2008, the IUPUI undergraduate student population was:  
46% FT/FT, 23% transfer, 12% returning adults, 9% non-degree,  
7% inter-campus transfer, 2% FT/FT international, and 1% all other.**



# CI-STEP INITIATIVES

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4 major categories of initiatives:

- Student Centered Pedagogies
- Career Services
- Student Success
- Articulation with Ivy Tech

For each initiative:

- Major research and education activities.
- Major findings resulting from these activities.
- Opportunities for training, development and mentoring.
- Opportunities for outreach activities.

- STEM Faculty Courses
- Transformation grants
- Expansion of PLTL, JiTT, Peer Mentoring

Students engaging in Peer Lead Team Learning



Student working on new microscopy lab

## Student-Centered Pedagogies



Proud student presenters at the 2011 STEM Showcase

- New CI-STEP Internship Program
- New School of Science Career Development Services

## Career Services

- Honors Seminars
- STEM Mentoring Programs
- STEM Summer Bridge



STEM Summer Bridge 2011. IUPI student mentors with their mentees

2011-2012 Women in Science House (WISH) cohort



## Student Success

## Articulation with 2 yr. Colleges

Math Professor Jeffrey Watt giving math students one on one attention



- New Mathematics Courses
- Collaboration with Bridges to the Baccalaureate
- Revised Articulation with Department of Engineering and Technology

# OTHER EFFORTS ON CAMPUS

Title	Investigators	Goal
Student Video STEM Projects	Andres Tovar and Randy Newbrough	Begin to develop video repository for students learning process to improve performance, retention and persistence to degree.
Summer Industrial Projects Program	Robert Durkin	Rekindle Soph/Jr. MET students' desire to become engineers, promote retention and persistence.
Develop a Rigorous Two-Year Mathematics Degree Engineering and Technology Alliance for Retention for Multicultural Students	Janet Dalzell Patrick Gee	Have 5 students complete their degree by 2013. Raise GPAs. Increase minority retention and accelerate time to graduation.
Transfer Student Recruitment and Support	Terri Talbert-Hatch	Teach a learning community at IVYTech. 20 students in June for 1.5 day orientation to increase retention.
Using the Inductive Learning Methodology to Reduce Student Failure Rates in MET	Paul Yearling	Reduce DFW rates in the course Intro to Thermodynamics and Heat Transfer.
From Studio to Student: e-Mentoring in Computer Graphics Technology	Jan Cowan and Dan Baldwin	Attract, retain new and existing students.
Exploring the Causes and Involving Faculty in Persistence	Barbara Christe	Alter instructors behaviors and attitudes.
Improving the Retention of Freshman Engineering Students through Proactive Peer Mentoring.	Stanley Chien	Increase freshman engineering retention by at least 12%
Promoting STEM Course via Introductory Videos	Sohel Anwar	Recruit students.
Enhancing Student Comprehension and Success in Genetics through Recitation	Mariah Judd and Brittiney Reese	Retain students.
Organic Chemistry Workshop Series	Rob Minto, Ryan Denton and Sarah Wilson	
Creating a Physics Learning Space	Andy Gavrin	

# NEXT ROUND OF MINI GRANT PROPOSALS

- Identify area of need that meets one of the goals of the grant
- Visit website for guidelines and deadlines on active Request For Proposals (RFP)
- Write proposal; including project/activity description, evaluation plan, budget and how the proposal helps meet the goals of the grant



[www.step.iupui.edu](http://www.step.iupui.edu)

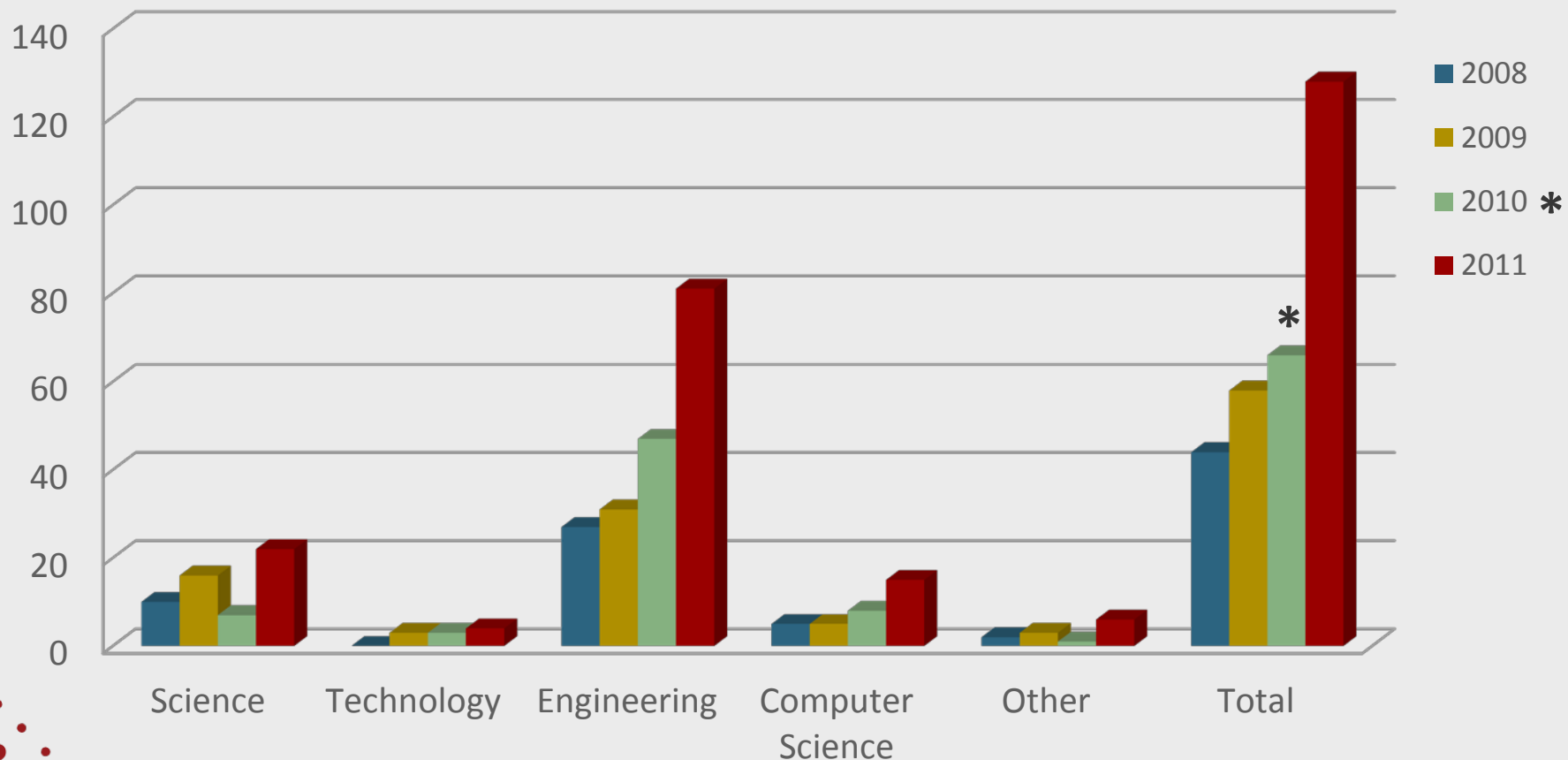
# PROJECT EVALUATION

## CI STEP Project: Two-Phase Assessment Framework

Assessing Processes	Assessing Outcomes
❖ Qualitative Data Sources	❖ Student Retention & Persistence Rates
☒ Questionnaires	❖ STEM Graduation Rates (by disciplines)
☒ Interviews	❖ Academic Performance (Scores, Grades, GPAs)
☒ Focus Groups	❖ Self-reported Learning Outcomes
❖ Program Participation/Completion Rates	❖ Student Satisfaction
❖ Student Surveys	❖ Faculty/Mentor Satisfaction
❖ Faculty/Mentor Surveys	❖ Student Engagement
❖ Course Evaluations	❖ Student Internships / Research Experiences
❖ Event Tracking	❖ Advanced Studies Pursued in STEM fields
❖ Attendance / User Sign-up Sheets	❖ Career or Job Placements in STEM fields

# PROGRESS

## IUPUI Math Minors Awarded per Year

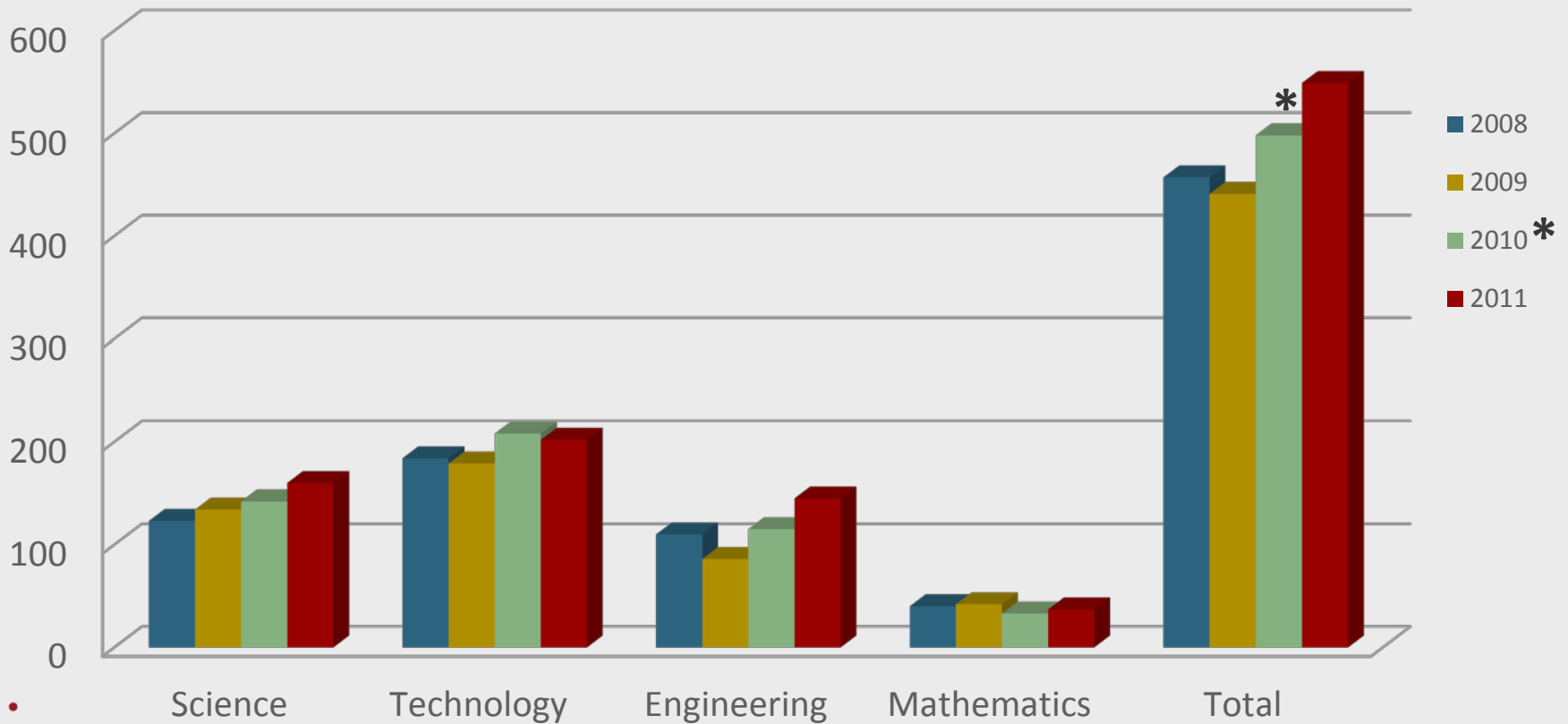


\* Start of grant. 2008 was baseline year.



# PROGRESS

## IUPUI STEM Graduates by Year



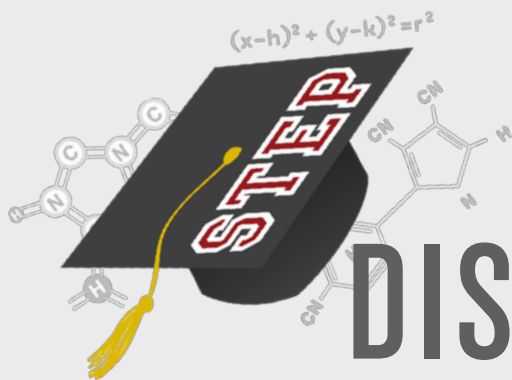
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# TRAJECTORY

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- By achieving a 10% increase per year, the increase in degrees, over 5 years, will result in almost 800 additional STEM degrees during the course of the grant.
- In 2011, the number of STEM graduates was on track to achieve the goal of 10% increase.
- 13 Mini-grants have been granted to date. More mini grants campus-wide will aid in the attainment of the goals. The second RFP should go out by Summer 2012.



# DISCUSSION and QUESTIONS



[www.step.iupui.edu](http://www.step.iupui.edu)

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# DISCUSSION PROMPTS

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- Are we helping our students reach graduation?
- Are you (and your colleagues) doing all you can to help IUPUI meet their mission of increasing graduation rates and reducing attrition?
- What efforts can you make to help contribute to the call for 1 million additional graduates? Do you have an idea that CI-STEP could help with?