IOWA STATE UNIVERSITY

DMACC
DES MOINES AREA COMMUNITY COLLEGE

NATIONAL SCIENCE FOUNDATION
STEM Talent Expansion Program (STEP)

STEM Student Enrollment and Engagement through Connections

ISU Internal Advisory Board Meeting

December 2, 2011

Grant No. 0653236, July 2007–July 2012

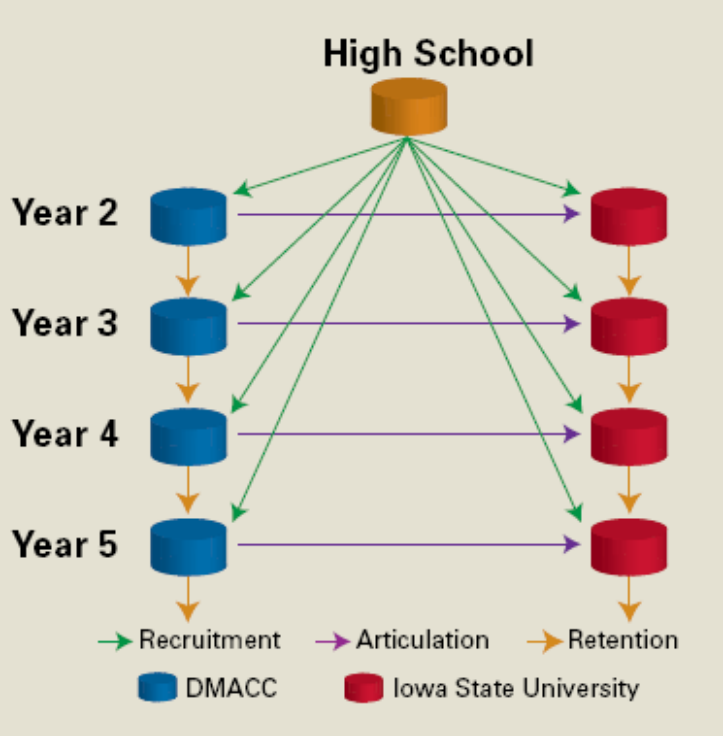
Agenda

- Key data updates
- Developing an engineering transfer student success model
- Diversity outcomes and evaluation
- Key project activities and outcomes to be sustained
- Spring meeting plans

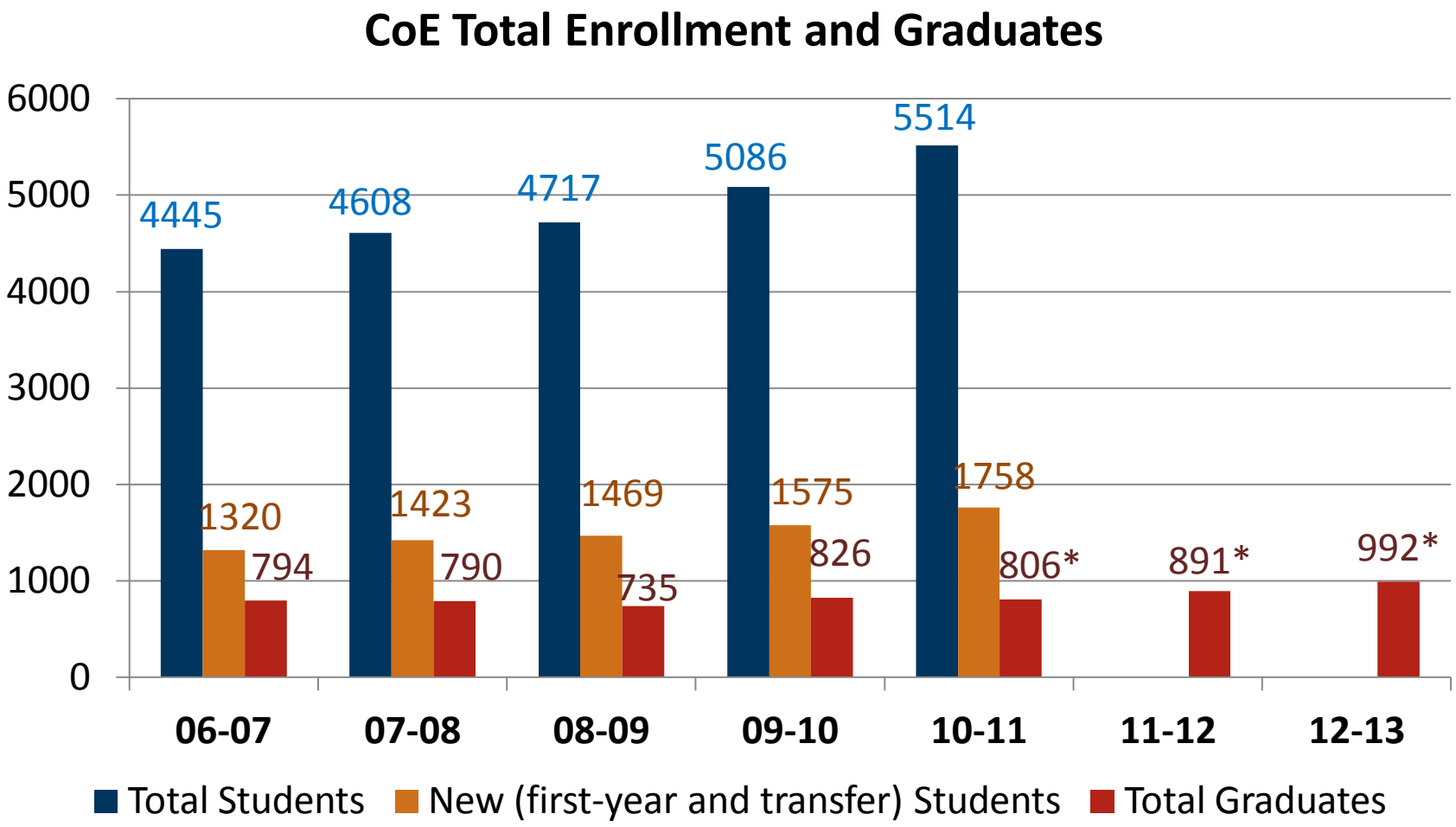
Overall Grant Goal

Increase engineering graduates to 900, by approximately 100 per year.

- Increase the number of pre-engineering students at DMACC.
- Increase the percentages of women and minority students in engineering at ISU and DMACC.

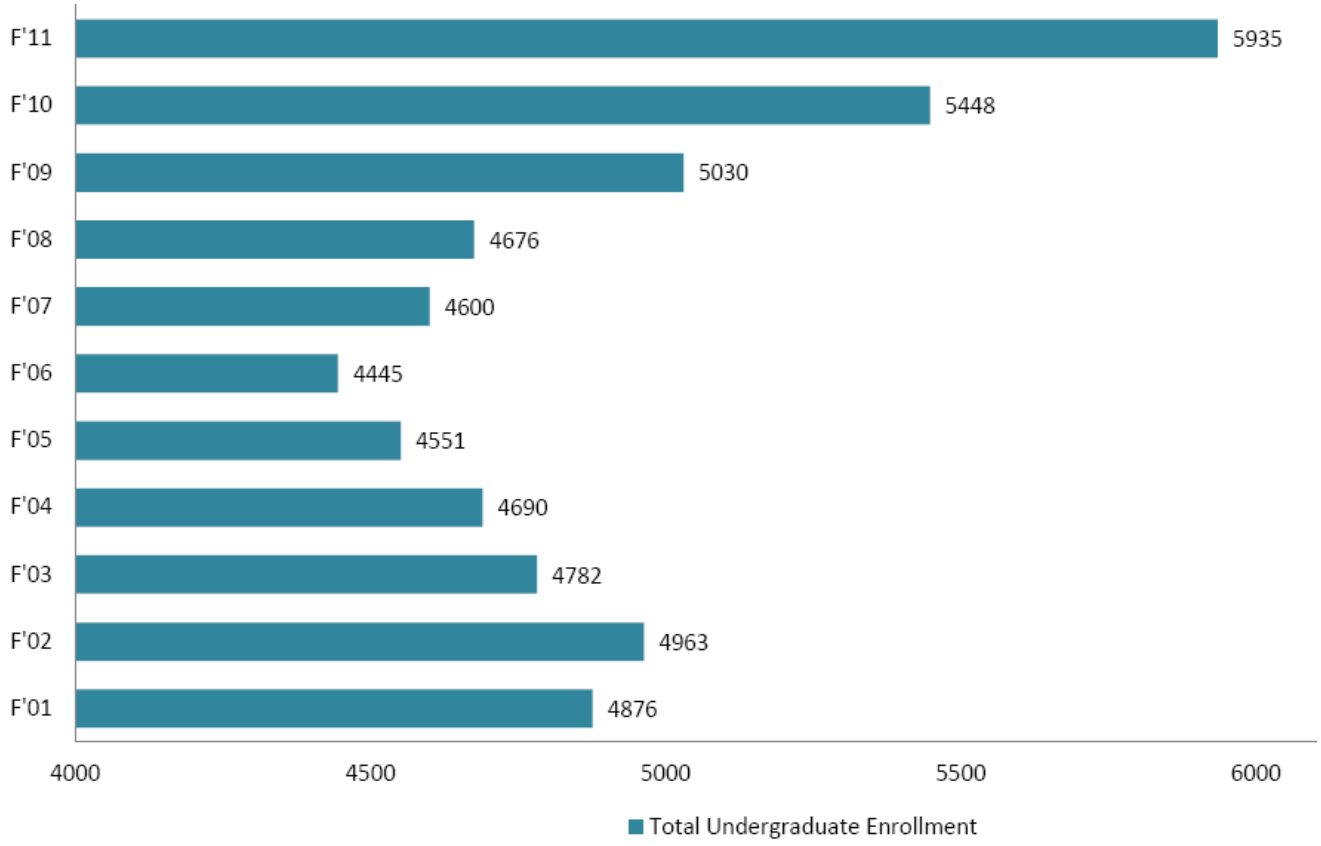


STEM Student Enrollment and Engagement through Connections



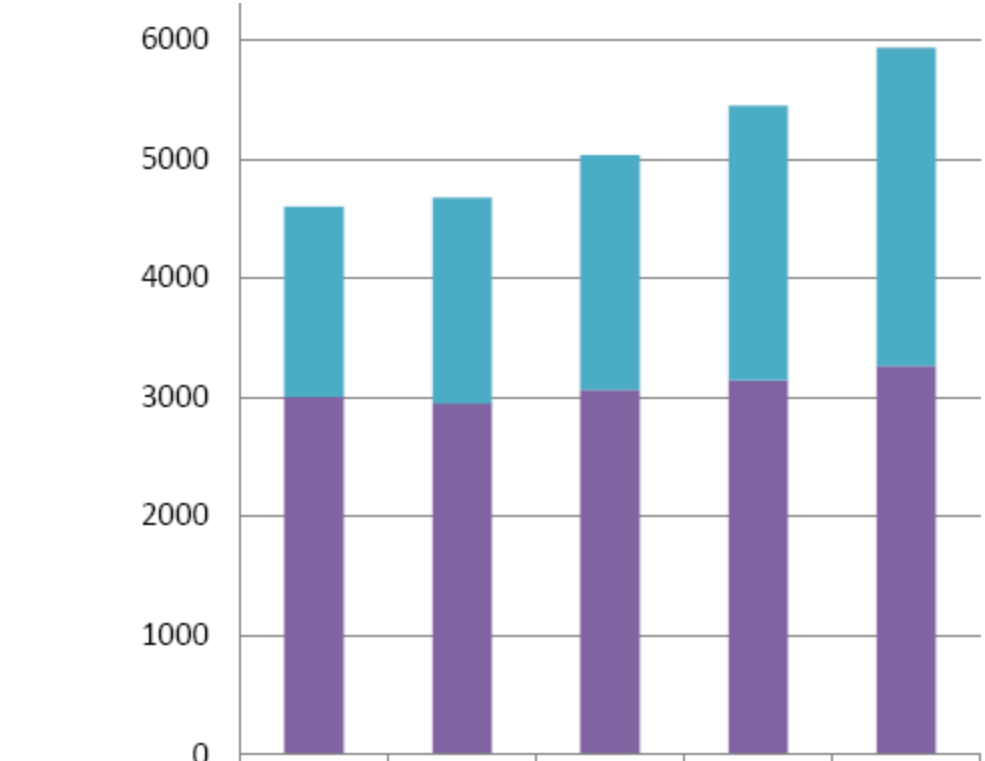
*Predicted – Based on Iowa State University Institutional Research

Engineering Undergraduate Enrollment (COE KPI)



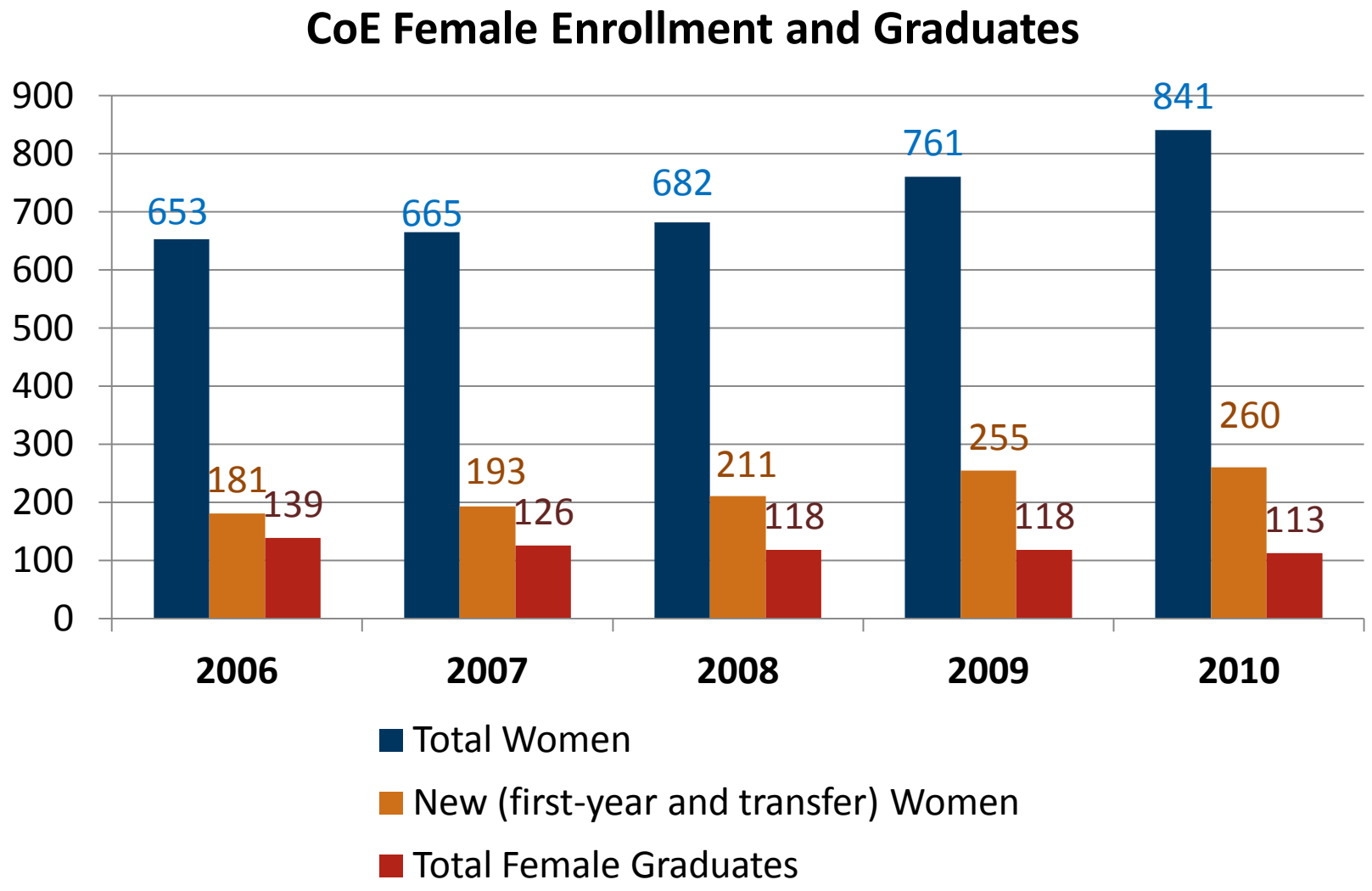
STEM Student Enrollment and Engagement through Connections

Engineering Undergraduate Enrollment (COE KPI)



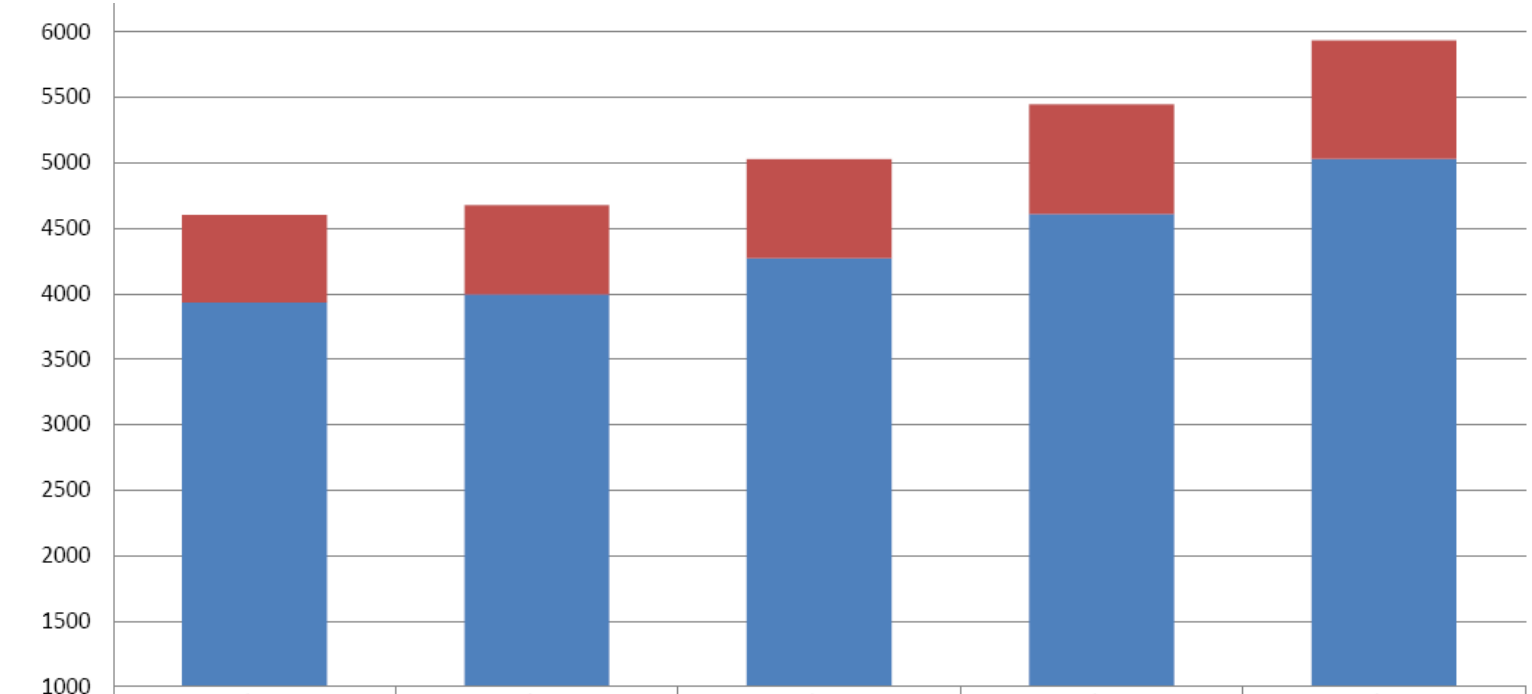
	F'07	F'08	F'09	F'10	F'11
Non-Resident	1599	1725	1966	2306	2668
Resident	3001	2950	3064	3142	3267

STEM Student Enrollment and Engagement through Connections



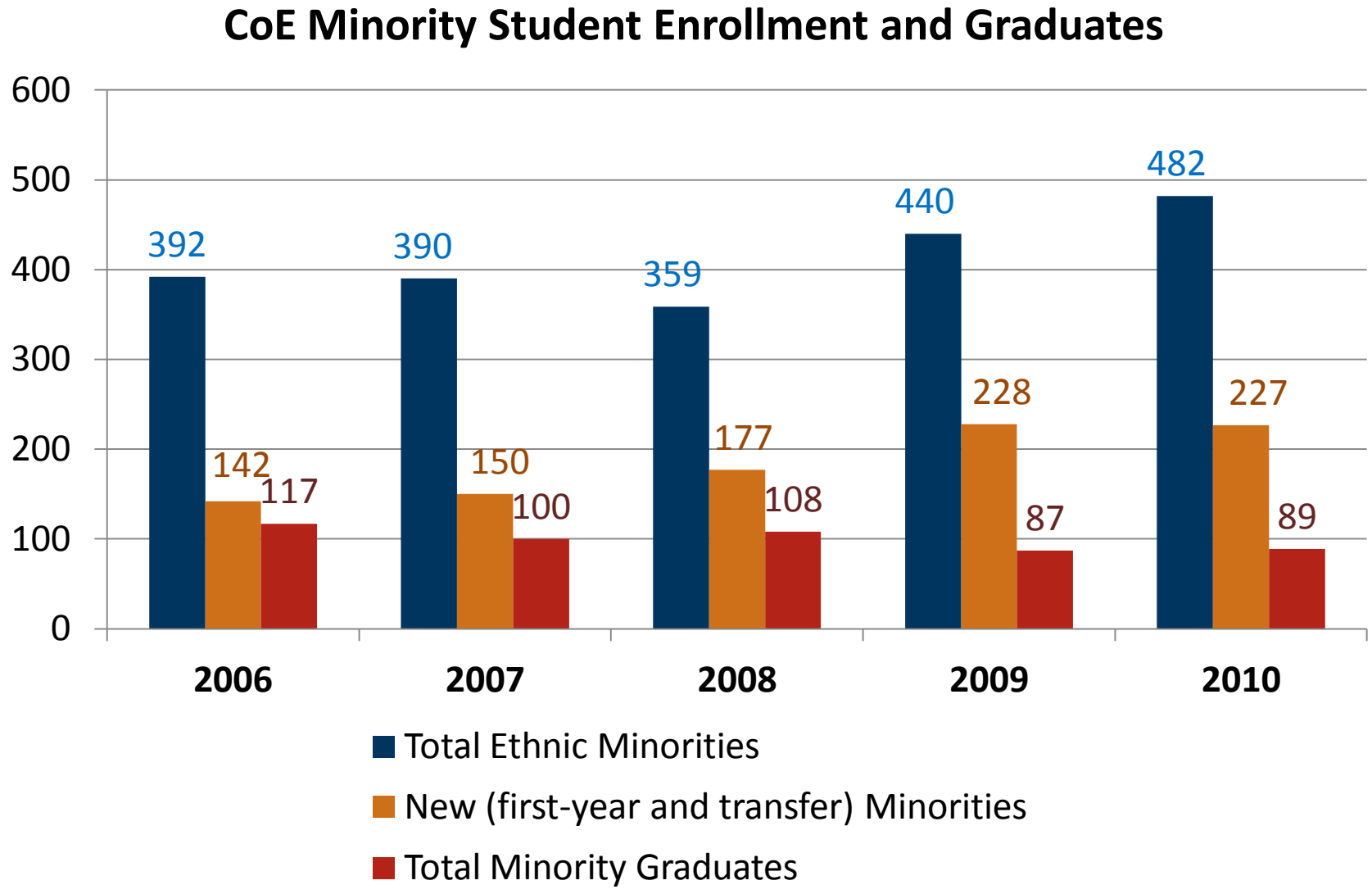
STEM Student Enrollment and Engagement through Connections

Engineering Undergraduate Enrollment (COE KPI)



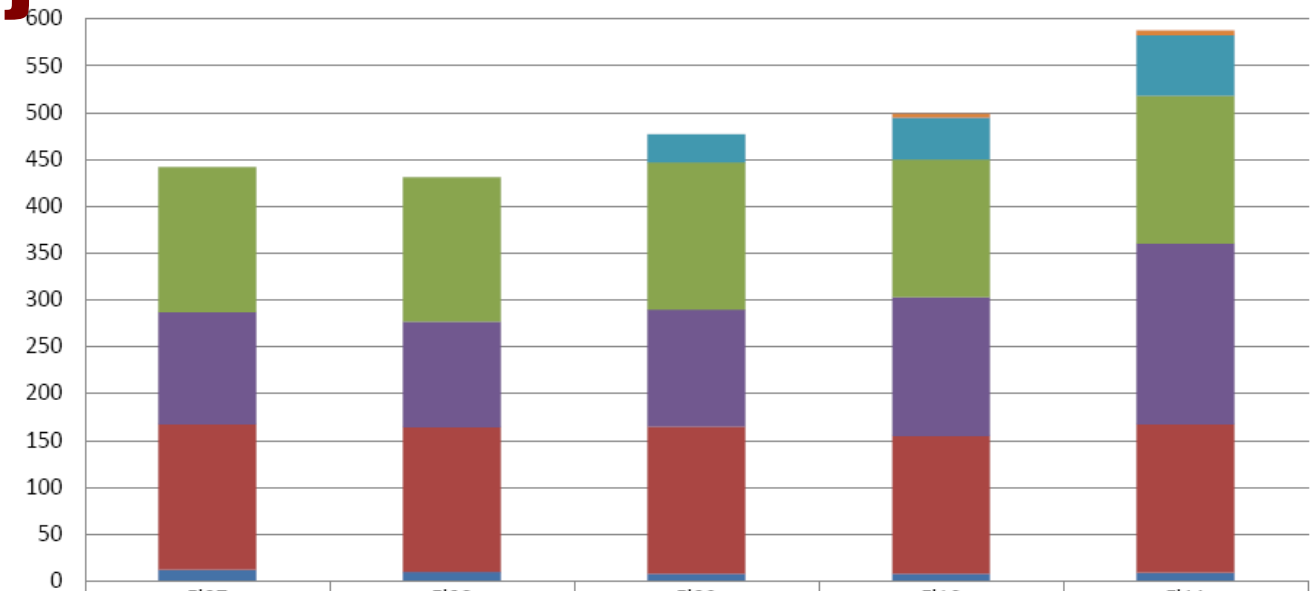
	F'07	F'08	F'09	F'10	F'11
Female	665	681	758	839	904
Male	3935	3995	4272	4609	5031

STEM Student Enrollment and Engagement through Connections



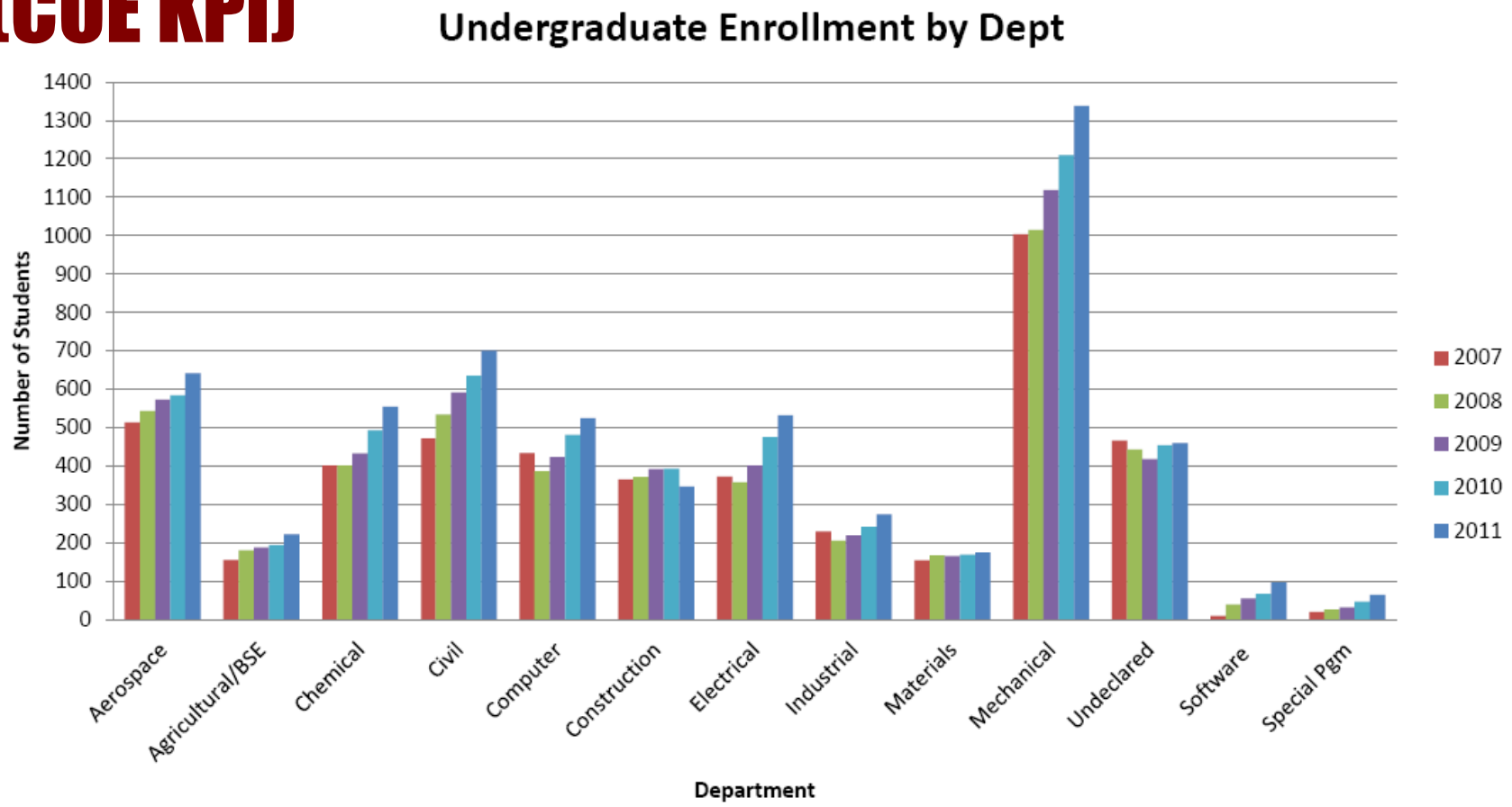
STEM Student Enrollment and Engagement through Connections

Engineering Undergraduate Enrollment (COE KPI)

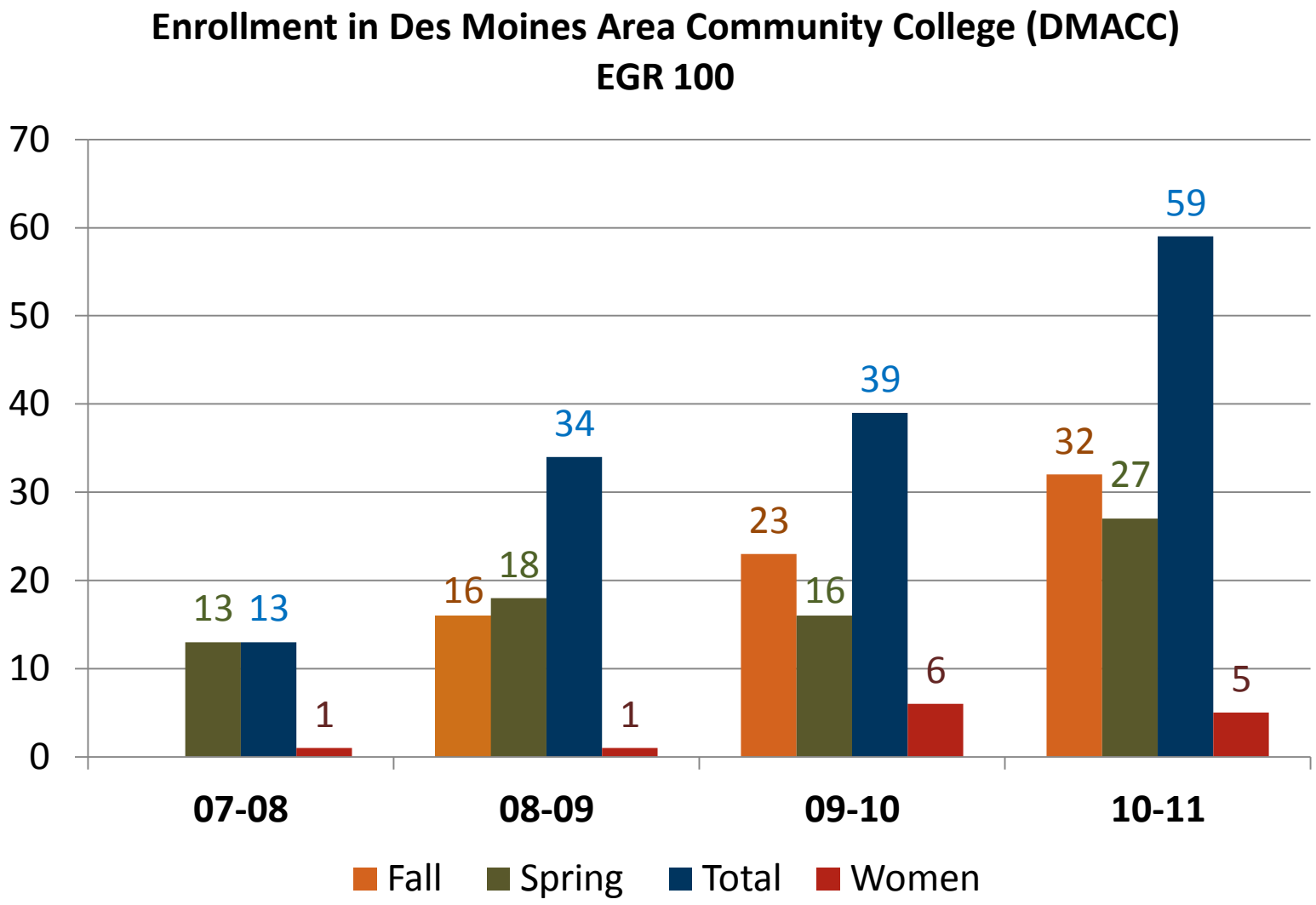


	F'07	F'08	F'09	F'10	F'11
Native Hawaiian			0	4	5
Multiracial			30	45	65
Asian American	155	154	157	147	158
Hispanic/Latino	120	113	125	148	193
African American	155	154	157	147	158
Am Indian/Alaskan Native	12	10	8	8	9

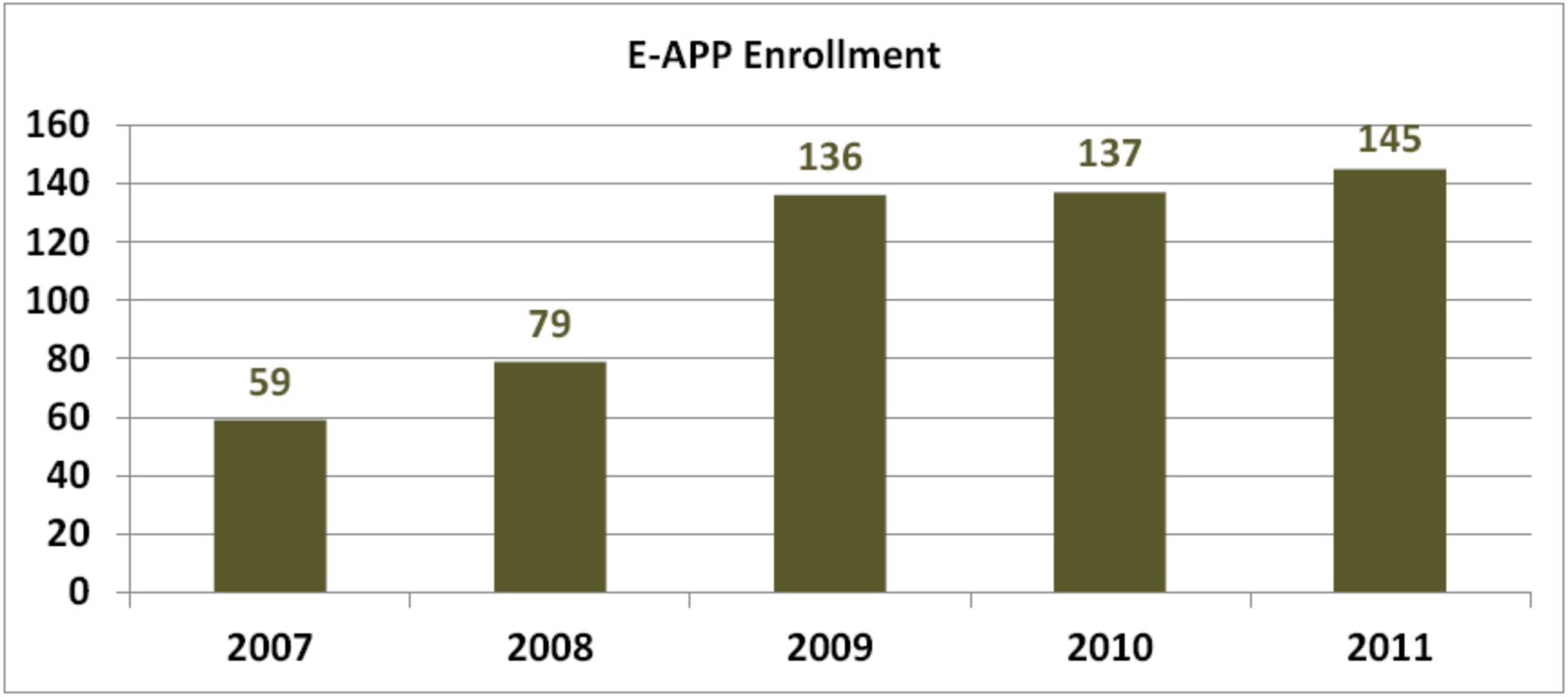
Engineering Undergraduate Enrollment (COE KPI)



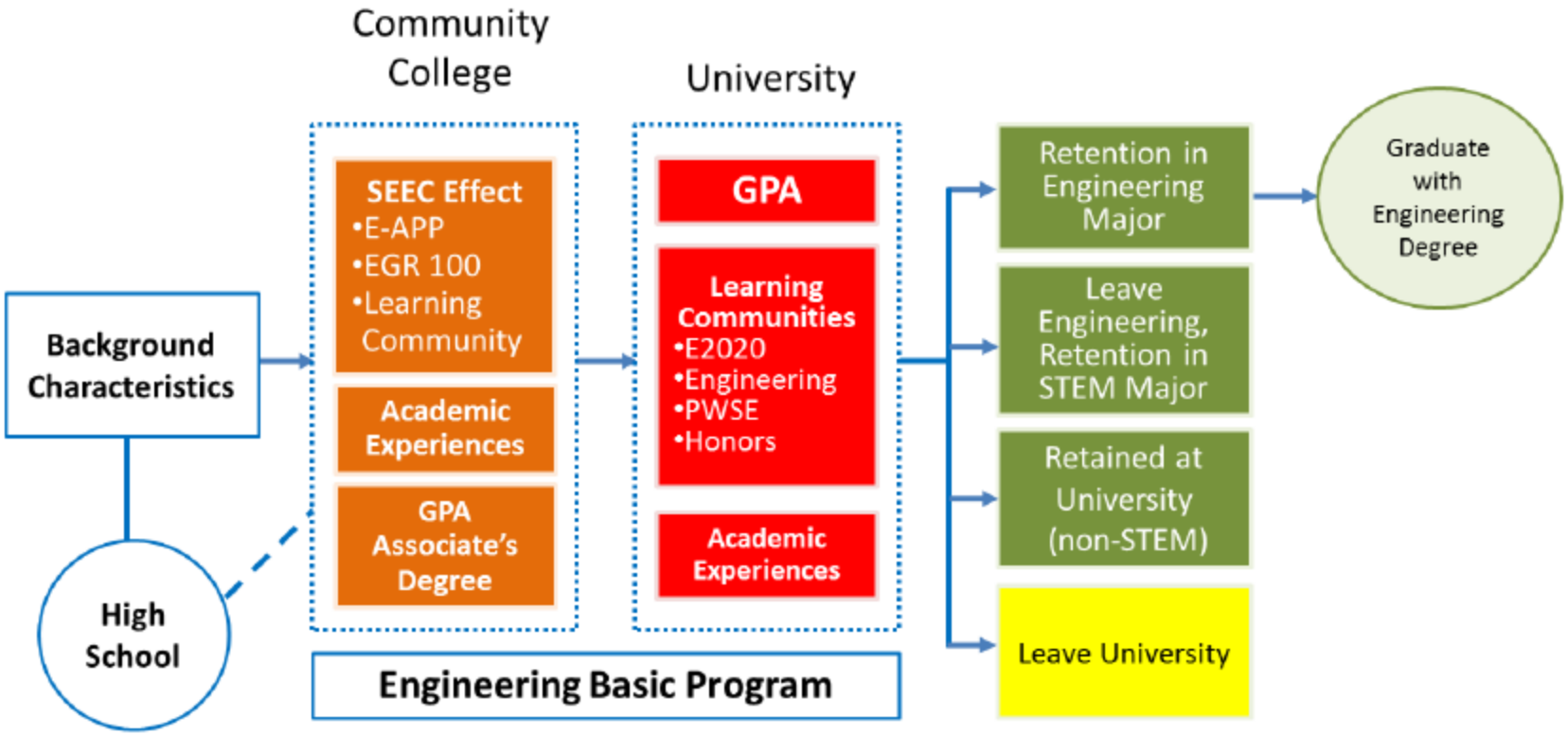
STEM Student Enrollment and Engagement through Connections



STEM Student Enrollment and Engagement through Connections



Developing an Engineering Transfer Student Success Model



Source: Laanan, F., Rover, D., Bruning, M., Mickelson, S., Shelley, M., & Darrow, M. (2011). Iowa State University. www.eng.iastate.edu/seec

Transfer Student Data Collection & Analysis

- E-APP participation and retention
- DMACC's EGR 100 enrollment
- 1-,2-, and 3-year retention in engineering at ISU
- Learning communities participation and retention
- Engineering Basic Program credits, course grades, and GPA at DMACC and ISU vs. retention
- ISU engineering graduation and placement data for transfer students

Outcomes by Admit Type

Admit Status	Fall 2002 - Fall 2009 data					
	First Fall GPA	First Year GPA	Transfer GPA	ENGR Retention after 1 year	ISU Retention after 1 year	N
Iowa CC transfer	2.31	2.42	3.06	66%	81%	1,011
Non-Iowa CC transfer	2.66	2.70	3.05	73%	82%	271
Four-year College transfer	2.75	2.86	3.04	70%	80%	714
High School Admit	2.72	2.78	3.46	74%	89%	9,065

Fall 2002 – Fall 2010 Engineering Admits

Admission Type	2002 - 2010 Count	ISU Basic Program Grades		Math ACT Scores		High School GPA	
		Mean	n	Mean	n	Mean	n
Iowa CC transfer	1,191	2.32	830	25.0	650	3.24	585
Non-IA CC transfer	355	2.72	254	25.3	89	3.34	122
Non-CC transfer	825	2.85	603	27.1	314	3.54	326
High School Admit	10,511	2.71	8,997	28.0	9,849	3.63	10,441

The Importance of Calculus

Iowa Community College Engineering Transfer Students, 2002-2005 ISU Entry Cohorts

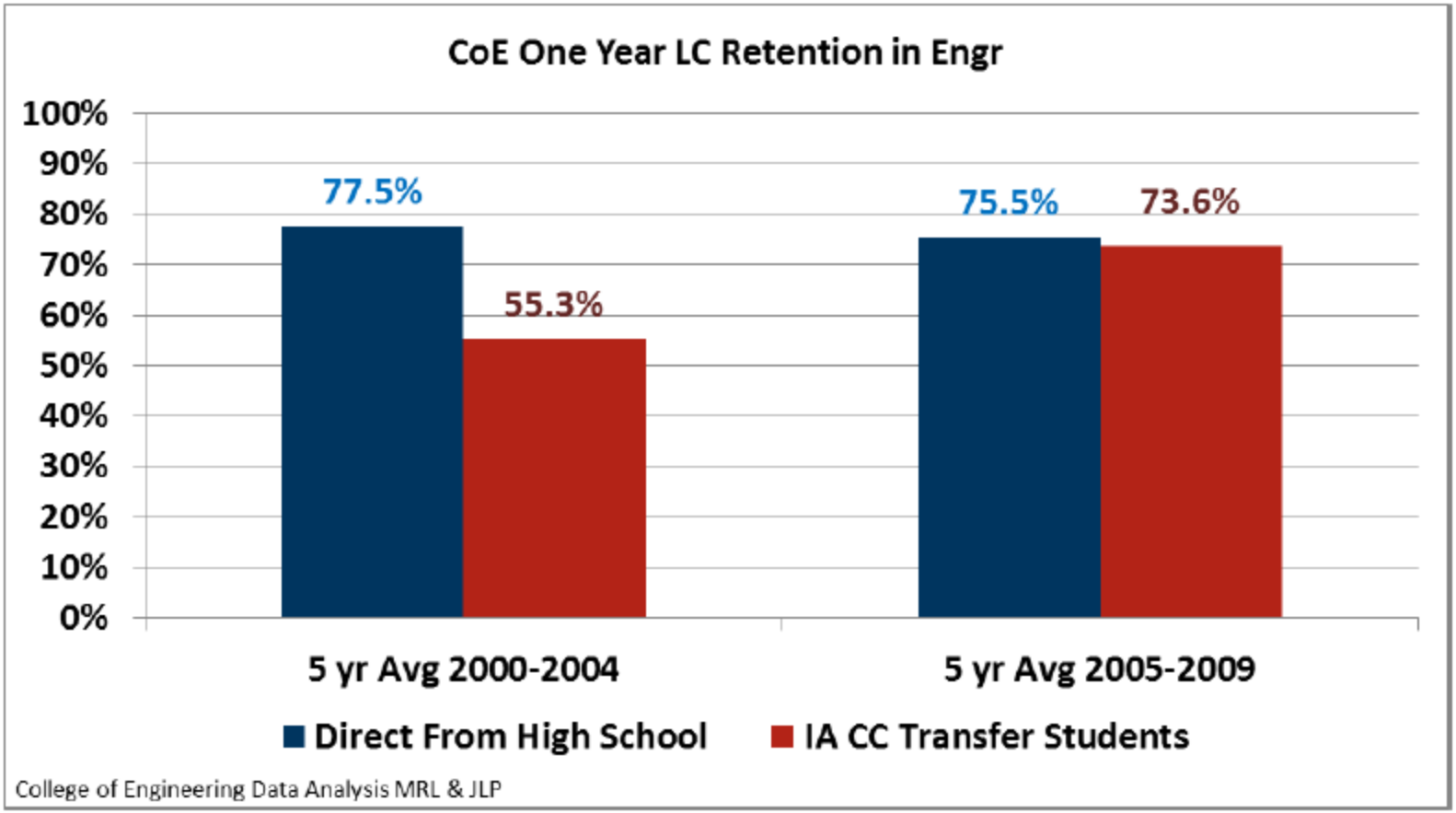
Community College classes taken and transferred to ISU	ENGR Retention after 1 year	Earned ENGR Degree	ISU Retention after 1 year	Earned ISU Degree	n
Calculus I, Calculus II, & Physics I	77%	69%	88%	79%	166
Calculus I & Calculus II	75%	66%	87%	76%	248
Calculus I, but not Calculus II	61%	34%	80%	63%	70
Neither Calculus I nor Calculus II	45%	25%	69%	49%	136
AVERAGE	64%	49%	80%	65%	472

E-APP Effects for Iowa Community College Transfer Students (entering 2008 – 2010)

College	Status	Retained in ENGR after 1 year		Retained at ISU after 1 year		Total Count
		n	%	n	%	
All Iowa Community College Transfers	E-APP	62	74%	77	**92%**	84
	not in E-APP	258	67%	313	81%	386
DMACC Transfers	E-APP	40	**77%**	47	**90%**	52
	not in E-APP	62	58%	81	76%	106

Significantly higher retention rates in **bold**

STEM Student Enrollment and Engagement through Connections



STEM Student Enrollment and Engagement through Connections

Messaging/Advising

Targeted messaging to students based on student success data

- Focus on the Engineering Basic Program while at the community college.
- Join E-APP/APP.
- Meet with academic adviser(s).
- Set goals for grades and GPA.
- Visit Iowa State.
- Use transfer websites and plan ahead.
- Participate in a LC.
- Live on/near campus when at ISU.
- Make a transition during the first semester.

TIPS FOR TRANSFERRING

CHOOSING TO TRANSFER? Here are some tips to help ensure your transition from DMACC to ISU's College of Engineering goes as smoothly as possible.***

While at DMACC:

Join the FREE Engineering Admissions Partnership Program (E-APP) learning community. This pre-engineering community is designed to enrich your transition to Iowa State. Research has shown that students who participate in E-APP are retained at a significantly higher level compared to those who don't. Find out more at **www.eng.iastate.edu/transfer/app** and talk to your advisor about signing up.

GPA matters! Entrance into ISU's College of Engineering requires completion of the basic program – with a grade point average of 2.00 or better in the basic program courses.

Grades do, too! It's been shown that the Engineering Basic Program GPA and transfer GPA are the best indicators for retention in the engineering program. These minimum grades indicate future success:

- B in Calculus Coursework
- B in Physics
- B in Engineering Problem Solving

Take advantage of the Engineering Transfer Student Webpage. Found at **www.eng.iastate.edu/transfer**, this page features many useful links for students looking to join the engineering program at Iowa State.

Use TRANSIT. This is an ISU computer tool that will tell you how the courses you take at DMACC will transfer to Iowa State. Find it at **https://transit.iastate.edu.**

Visit Iowa State's campus. And while you're there, stop by your advisor's office.

Meet regularly with DMACC and ISU advisors. Connect early and often!

While at Iowa State:

Participate in a learning community (LC). Students who participate in a learning community at ISU are retained at a significantly higher level than those who don't. Multiple LC participation increases retention even more.

Live in Ames. Research has shown that engineering students who live in Ames have a much higher level of success than commuters.

Get into a study routine. And stick with it.

Prepare for your adjustment to Iowa State's College of Engineering:

- Take 12-15 credits your first semester at ISU.
- Get to know engineering faculty, staff and students. Don't be afraid to reach out to them!
- Access the academic, social and professional resources available to you.

***These tips are conclusions based on ongoing research from Iowa State University, National Science Foundation, SEEC Grant, Statistical Data 2011.

DMACC Pre-engineering Brochure

Discussion

- Developing an engineering transfer student success model
  - Programming, advising and courses/curriculum
  - DMACC vs. other Iowa community colleges
  - Program, staff and faculty development
  - Data reporting, sharing and a culture of evidence

- **What should SEEC accomplish through the end of the project?**
- **What may need continued attention beyond the project?**

Diversity Outcomes and Evaluation

- Overall project goals (Dec. 2009 Data Update)
  - Among SEEC graduates (wrt baseline data):
    - Percentage of women: 19.4% (175 total)
    - Percentage of minorities: 8.3% (75 total)
  - Within 5 years after the project: 25%, 12%, respectively
  - Generalized targets: 20% and 10%
  - Research-based strategies: NAE's Changing The Conversation study
- Feedback from the Third Year Review
  - To increase the percentage of women students in engineering at ISU, pursue a strategy that is intellectually rigorous based on all available data.

Enrollment Data

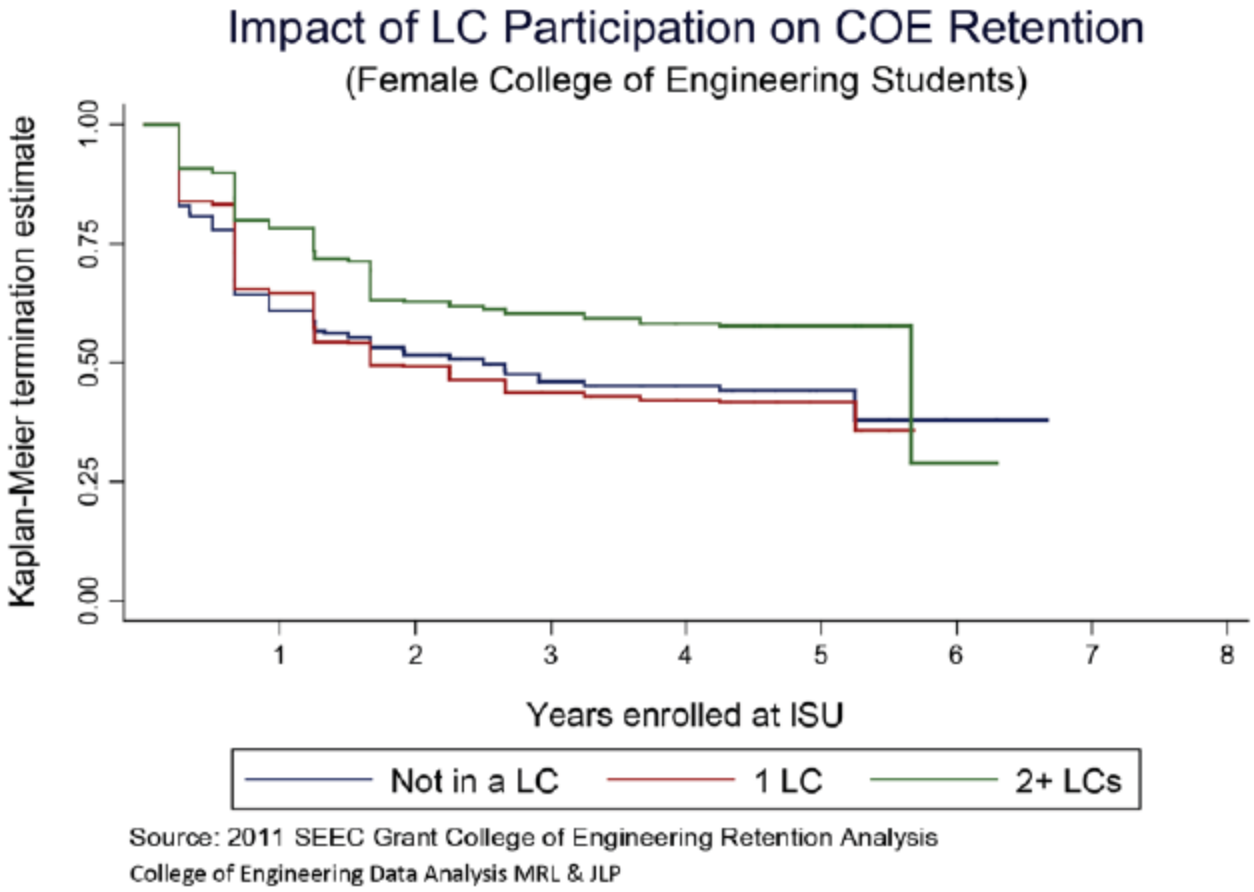
Increasing numbers of students in total engineering undergraduate enrollment:

- Women: 665 (14.5%) → 681 → 758 → 839 → 904 (15.2%): +239 (+36%)
- Men: 3935 → … → 5031: +1096 (+27.8%)
- Minority Groups: 442 (9.6%) → 431 → 477 → 499 → 588 (9.9%): +146 (+33%)

Current percentages of total engineering undergraduate enrollment:

- Women: 15.2%
- Minority Groups: 9.9%

Multiple Learning Community Effect



Estimates from the longitudinal data show that female students in the College of Engineering who participate in two or more learning communities are retained at a much a higher rate.

STEM Student Enrollment and Engagement through Connections

Transfer Student Diversity

New Transfer Students to the College of Engineering (Iowa State University)											
Summer/Fall 2007	**Female**	**Male**	**American Indian**	**African American**	**Asian American**	**Caucasian**	**Hispanic**	**Multi-racial***	**Inter-national**	**Un-known**	**Total**
Des Moines Area Community College		31		2	2	23		-		4	31
Other Iowa Two-Year Transfer	4	72		2		70		-	2	2	76
Out of State Two-Year Transfer	4	22		1	1	12		-	11	1	26
Four-Year Transfers	8	65		1	1	40		-	27	4	73
Total	16	190		6	4	145		-	40	11	206
Summer/Fall 2008	**Female**	**Male**	**American Indian**	**African American**	**Asian American**	**Caucasian**	**Hispanic**	**Multi-racial***	**Inter-national**	**Un-known**	**Total**
Des Moines Area Community College	7	35	1	2	2	34		-	1	2	42
Other Iowa Two-Year Transfer	3	76		1	1	71		-	1	5	79
Out of State Two-Year Transfer	4	21		1	1	10	1	-	11	1	25
Four-Year Transfers	12	57			2	37	2	-	25	3	69
Total	26	189	1	4	6	152	3	-	38	11	215
Summer/Fall 2009	**Female**	**Male**	**American Indian**	**African American**	**Asian American**	**Caucasian**	**Hispanic**	**Multi-racial***	**Inter-national**	**Un-known**	**Total**
Des Moines Area Community College	3	44	1	5	2	34	1	1	2	1	47
Other Iowa Two-Year Transfer	4	84		1	1	80		1		5	88
Out of State Two-Year Transfer	5	21		4	1	14			7		26
Four-Year Transfers	20	71		3	2	35	1	1	45	4	91
Total	32	220	1	13	6	163	2	3	54	10	252
Summer/Fall 2010	**Female**	**Male**	**American Indian**	**African American**	**Asian American**	**Caucasian**	**Hispanic**	**Multi-racial***	**Inter-national**	**Un-known**	**Total**
Des Moines Area Community College	3	44	1	3	3	35			4	1	47
Other Iowa Two Year Transfer	11	96	1		3	94	1	1	1	6	107
Out of State Two-Year Transfer	19	49		1	3	15	1	1	45	2	68
Four-Year Transfers	17	70		1	2	42	2		35	5	87
Total	50	259	2	5	11	186	4	2	85	14	309
Summer/Fall 2011	**Female**	**Male**	**American Indian**	**African American**	**Asian American**	**Caucasian**	**Hispanic**	**Multi-racial***	**Inter-national**	**Un-known**	**Total**
Des Moines Area Community College	8	38		3	3	34	3		1	2	46
Other Iowa Two Year Transfer	9	90		3	3	82	3	1		7	99
Out of State Two-Year Transfer	12	38		1	2	18	1		27	1	50
Four-Year Transfers	16	92			4	50	3	1	47	3	108
Total	45	258		7	12	184	10	2	75	13	303

*Note: Multi-racial was not a category prior to Fall 09

Source: Registrar's Office, Iowa State University, Jonathan Compton, jcompton@iastate.edu, 515-294-4168

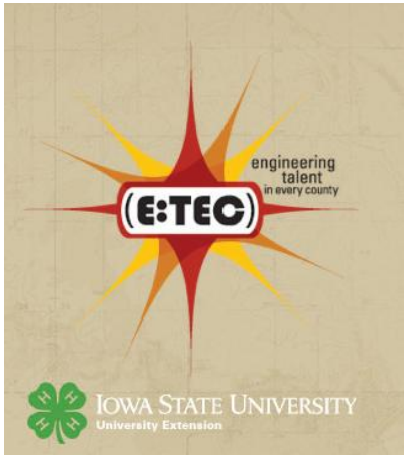
Transfer Student Diversity

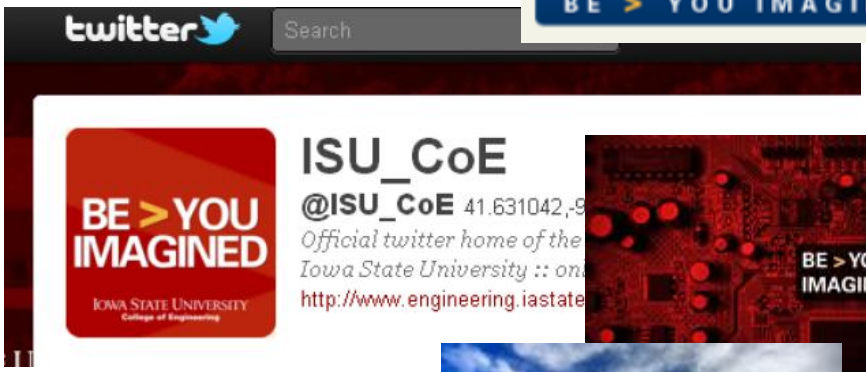
Summer/Fall 2007	Female	Male	Total	
Des Moines Area Community College		31	31	0%
Other Iowa Two-Year Transfer	4	72	76	5.3%
Out of State Two-Year Transfer	4	22	26	15.4%
Four-Year Transfers	8	65	73	11%
Total	16	190	206	7.8%

Summer/Fall 2011	Female	Male	Total	
Des Moines Area Community College	8	38	46	17.4%
Other Iowa Two Year Transfer	9	90	99	9.1%
Out of State Two-Year Transfer	12	38	50	24%
Four-Year Transfers	16	92	108	14.8%
Total	45	258	303	14.9%

STEM Student Enrollment and Engagement through Connections

Broadening Participation





E2020
SCHOLARS PROGRAM

Discussion

- Diversity outcomes and evaluation
  - Changing The Conversation (NAE)
    - Career awareness, recruitment, courses/curriculum
    - Benchmarking
    - Evaluation of impact and effectiveness
  - Data collection and analysis

  - **What should SEEC accomplish through the end of the project?**
  - **What may need continued attention beyond the project?**

STEM Student Enrollment and Engagement through Connections

Project Activities and Outcomes to be Sustained

Logic Model Planning

Resources → Activities → Outputs → Outcomes → Impact

01. Learning Village

Objectives:
To build a learning village that enhances student engagement and creates Iowa State connections for community college pre-engineering transfer students

2011 Highlighted Short-Term Outcomes:
1. The college has customized Iowa State's Admissions Partnership Program (APP) with Iowa community colleges to support prospective transfer students in engineering, called E-APP.
2. The Transfer Peer Mentor Program includes a web-based professional network which promotes multiple points of engagement for community college students. Transfer peer mentors serve as leaders in E2020 (S-STEM) transfer cohort seminars.
3. All Iowa State engineering departments have learning communities, and some have started transfer learning communities.

02. Curriculum

Objectives:
To enhance first- and second-year learning experiences, with an emphasis on student success and engagement and classroom climate

2011 Highlighted Short-Term Outcomes:
1. Targeted program offerings provide pre-engineering and engineering students with key learning experiences and professional development (e.g., ENGR 110 and 210 E2020 courses, bioengineering minor, and DMACC/EGR 100).
2. Departments are interested in the transfer student transition and curricular aspects (e.g., transfer learning communities, sophomore courses, and 2+2 programs).
3. A university-wide student success summit and continued SEEC project emphasis on data analysis of students' academic performance and success will inform department activities.

03. Advising

Objectives:
To develop and enhance academic advising and mentoring programs for precollege, community college, and university students

2011 Highlighted Short-Term Outcomes:
1. Transfer students are entering engineering with a clear plan and connections that will assist them in making a smooth transition.
2. ISU and CC advisers and faculty are engaged in activities aimed at dissemination of student success reports, best practices, curriculum and new resources.

04. Networking

Objectives:
To establish a recruiting and outreach network across Iowa to tap into diverse communities of students, and to improve the awareness and understanding of engineering among those who influence student choice

2011 Highlighted Short-Term Outcomes:
1. CYSTEM (Connecting Youth with Science, Technology, Engineering and Math), an interactive, web-based GIS map/information repository was launched to connect Iowa youth, parents, and formal and informal educators to STEM resources (programming, mentors, and introduction to engineering jobs) in Iowa.
2. Partnerships and networking continue with University Extension, academic departments, Program for Women in Science and Engineering, Iowa State Admissions, industrial boards, and alumni and educator networks.

05. Evaluation*

Objectives:
To evaluate project effectiveness that will enhance project activities

2011 Highlighted Short-Term Outcomes:
1. Data sources and procedures for continuous tracking of retention and enrollment of College of Engineering students with a focus on DMACC transfers and new freshmen has been established.
2. Longitudinal qualitative and quantitative assessment and evaluation activities are in place.

* *Led by Iowa State University Research Institute for Studies in Education (RISE)*

Project Activities and Outcomes to be Sustained

Potential Longer-Term Outcomes

- Continue to build a culture that embraces transfer student programming through professional and program development.
- Leverage learning community best practices to retain students at the second- and third-year levels, ultimately contributing to higher graduation rates.
- Use synergistic partnerships (e.g., with ISU Extension) to develop new resources and create interest in engineering study and careers.

Continuing Challenges

- Recruiting and retaining women to make up at least 20% of engineering graduates.
- Measuring and documenting outcomes to improve and sustain effective practices and promote a culture of evidence.

Discussion

- Project activities and outcomes to be sustained
  - Learning Village: EGR 100 course (DMACC), E-APP (various program elements), transfer LCs at ISU, multiple LCs for women at ISU
  - Advising: targeted messaging with (CC) students, advisers, faculty
  - Networking: CTC, resource kits, career awareness (CySTEM, E-TEC)
  - Curriculum: pre-engineering programs, BP success, E2020 pillars
  - Evaluation: enrollment reports, student success data management

  - **What factors affect sustainability?**

Spring Meetings

- ISU/DMACC capstone workshop for staff and faculty
- Workshop on transfer student success model for all Iowa community colleges
- Joint ISU/DMACC advisory boards meeting
- Transition planning with campus partners
- Various project evaluation activities

Meta-Evaluation with Key Stakeholders

Via focus group(s) and/or interviews:

- Unintended consequences?
- Broader impacts beyond SEEC, CoE?
- What worked well, what didn't, and what would you have done differently?