

Leading Excellence: A vision for the Future of Industrial and Systems Engineering in the Nation's Premier Program

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*Professor
Industrial and Systems Engineering
University of Minnesota*

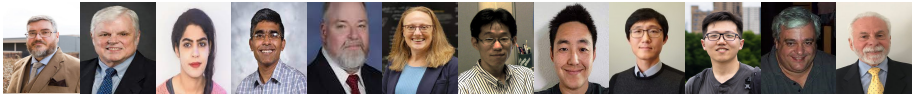
October 16, 2024

1. Discuss your background in relation to the role
2. What are the biggest challenges and opportunities that you see for ISYE

Academic Path

- ▶ **UG:**
 - ▶ Université Catholique de Louvain (Belgium)
 - ▶ Applied Mathematics Engineering
- ▶ **PhD:**
 - ▶ Georgia Institute of Technology
 - ▶ Industrial and Systems Engineering
 - ▶ Algorithms, Combinatorics and Optimization
- ▶ **Assistant Professor:**
 - ▶ Purdue University
 - ▶ Industrial Engineering
- ▶ **Associate Professor/Full Professor:**
 - ▶ University of Florida
 - ▶ Industrial and Systems Engineering
- ▶ **Full Professor:**
 - ▶ University of Minnesota
 - ▶ Industrial and Systems Engineering

Research (in a nutshell)



Research:

- ▶ Mixed integer nonlinear programming theory and algorithms
- ▶ Multi-disciplinary cooperations with medical school, public affairs, . . .
- ▶ Applied work with railroads.

Research support & funding:

- ▶ Sponsored work from NSF, AFOSR
- ▶ Sponsored work from UP, CSX



Professional preparation

Undergraduate program:

- ▶ [[@Purdue:](#)] IE ABET committee member
- ▶ [[@UMN:](#)] ISyE UCC committee member
- ▶ **Contributions:**
 - ▶ Revamping optimization curriculum
 - ▶ Alumni advisory board

Graduate program:

- ▶ [[@UF:](#)] ISE Graduate coordinator
- ▶ **Contributions:**
 - ▶ Supervision of PhD student teaching courses
 - ▶ Individual Development Plans

Faculty:

- ▶ [[@UMN:](#)] CSE P&T committee
- ▶ [[@UMN:](#)] ISyE director of faculty and academic affairs
- ▶ **Contributions:**
 - ▶ Assistant Professors mentoring structure
 - ▶ Peer review of teaching
 - ▶ Inaugural lectures

Professional preparation

Research support & funding:

- ▶ [CUF:] RAC (Research advancement council)
- ▶ [UMN:] RAC (Research advisory committee)

Leadership development

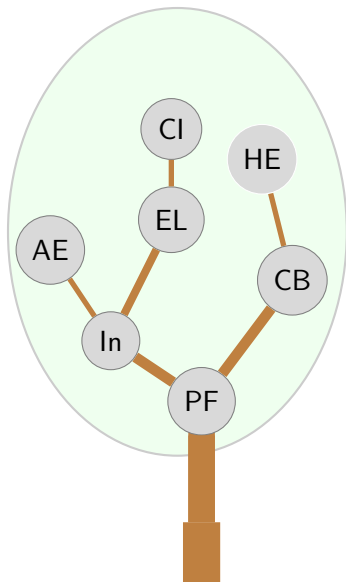
- ▶ [UMN:] Faculty leadership development program (LEADS)
- ▶ [UMN:] ISyE leadership committee
- ▶ Contributions:
 - ▶ Faculty hiring plan
 - ▶ Program review

Research community:

- ▶ Member of boards: MOR, JOGO, IISE Transactions, ...
- ▶ Member of research awards committee: JFIG, Nicholson, ...
- ▶ Involvement with professional societies: cluster chair, program committee, ...
- ▶ Panel member: NSF, ...

Management approach & values

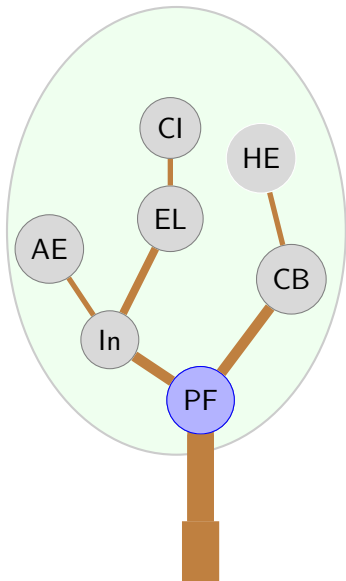
Values:



Management approach & values

Values:

▶ People First

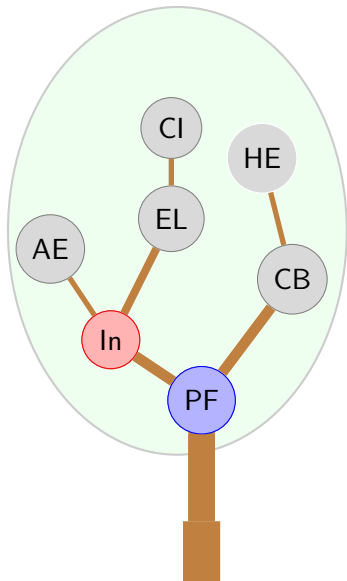


Management approach & values

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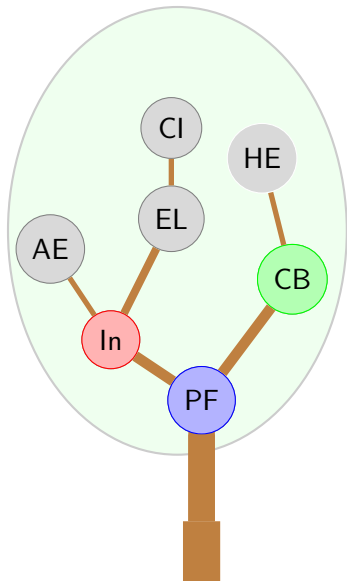
▶ Inclusivity



Management approach & values

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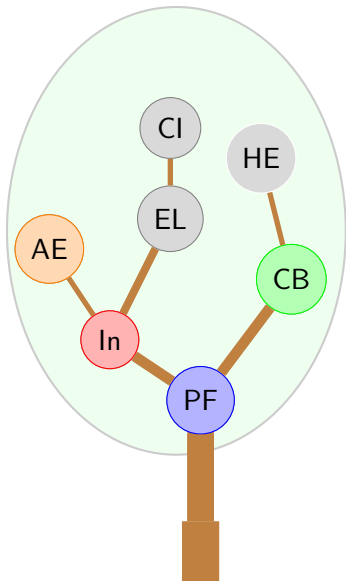
- ▶ People First
- ▶ Inclusivity
- ▶ Consensus Building/
Transparency
- ▶
- ▶
- ▶
- ▶



Management approach & values

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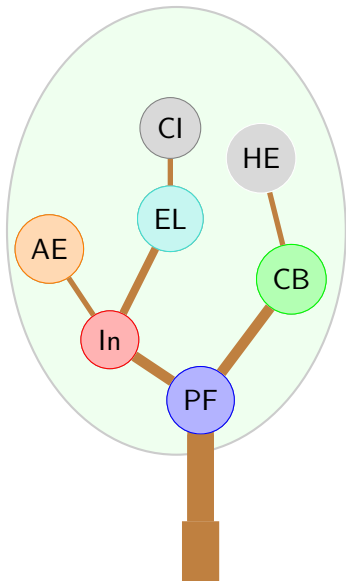
- ▶ People First
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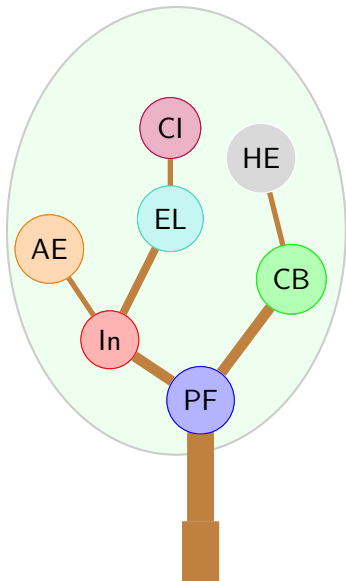
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- ▶ Ethical Leadership
- ▶
- ▶



Management approach & values

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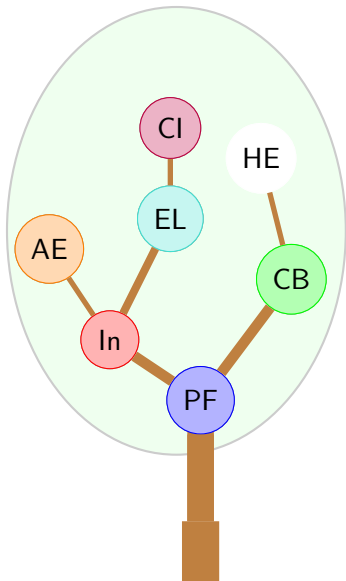
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- ▶ Ethical Leadership
- ▶ Continuous Improvement
- ▶



Management approach & values

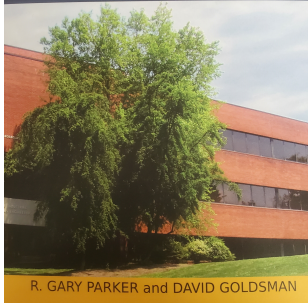
Values:

- ▶ People First
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- ▶ Consensus Building/
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- ▶ Academic Excellence
- ▶ Ethical Leadership
- ▶ Continuous Improvement
- ▶ High Expectations



Another Kind of Program

The H. Milton Stewart School of
Industrial and Systems Engineering
at Georgia Tech 1945-2020:
A Perspective on the First
Seventy-Five Years



R. GARY PARKER and DAVID GOLDSMAN

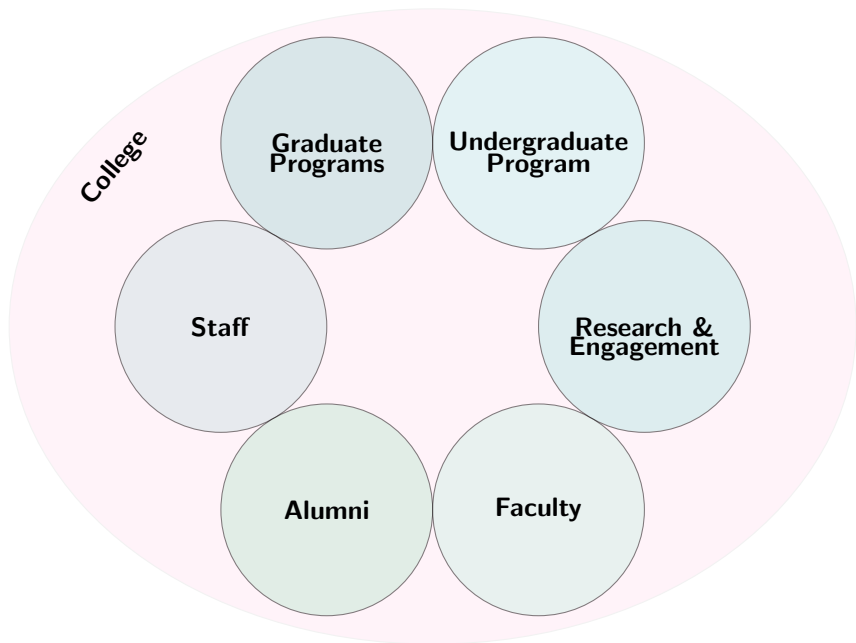
Vision

By driving innovation, fostering cross-disciplinary collaboration, and amplifying societal impact, the School of Industrial and Systems Engineering will tackle the most pressing challenges in understanding, designing, optimizing, and managing complex systems that integrate people, processes, technology, and resources.

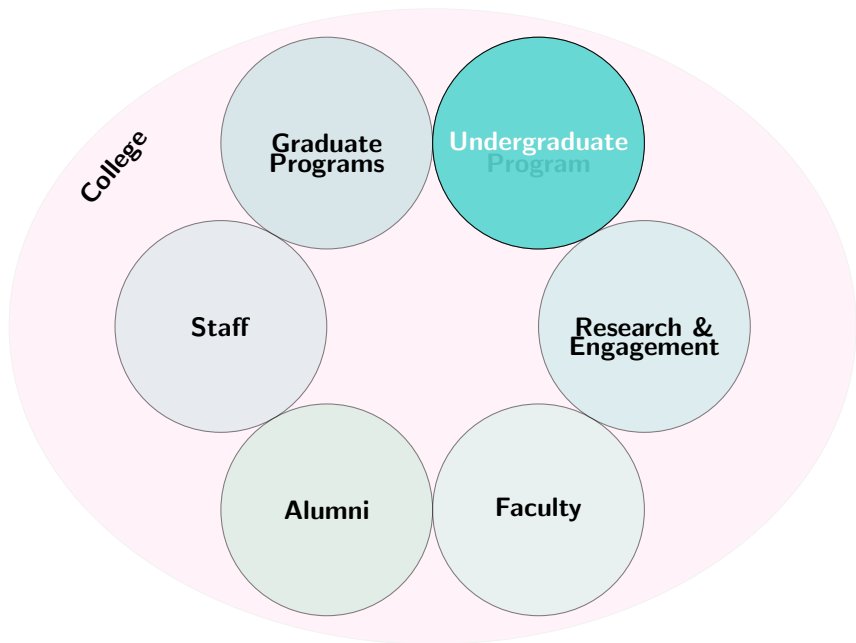
Building on its legacy of excellence and leadership, the department will continue to be the beacon for the field, shaping its future through groundbreaking research, thought leadership, and the transformative education of engineers, leaders, entrepreneurs from diverse backgrounds.

With a strong sense of purpose, it will expand its global influence, leveraging its technological and engineering advancements to shape a better future for society.

Pillars



Pillars



Pillar 1: Undergraduate education

To strive for:

1. Rigorous, relevant, and forward looking curriculum designed to prepare students for diverse career paths
2. Diverse and inclusive environment

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To strive for:

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 - 1.1 Varied learning experiences
 - ▶ inside the classroom, outside of the classroom
 - 1.2 State-of-the-art technology
 - ▶ equipment and technology that facilitate hands-on learning and research
 - 1.3 Industry connections
 - ▶ speakers, capstone, internships, networking, insights
 - 1.4 Strong employer demand
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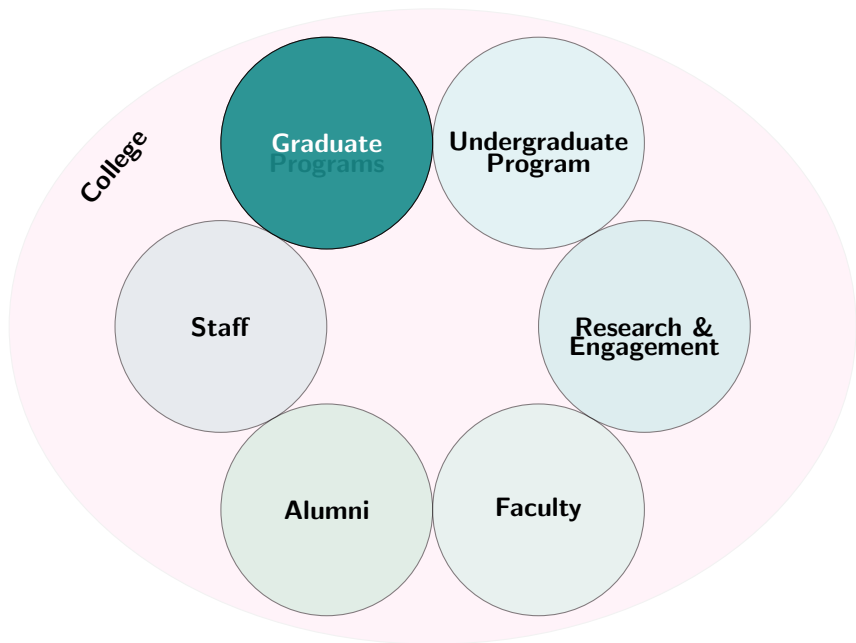
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 - 1.4 Strong employer demand
2. Diverse and inclusive environment
 - 2.1 Increasing pipelines to under-represented communities
 - 2.2 Strong student support systems
 - ▶ advising, mentoring programs, and tutoring

Pillar 1: Undergraduate education

Strategies, Opportunities, and Challenges:

1. Develop new joint programs: CS + ISyE?
2. Increase interdisciplinary pathways (4+1?):
 - ▶ Business?
 - ▶ Biomed?
 - ▶ Math?
3. Promote multidisciplinary capstone design
4. Facilitate exploration of new teaching methods
5. Increase the pool of students from under-represented backgrounds
6. Support struggling students
7. Target recognition in undergraduate competitions (IISE, INFORMS, ...)

Pillars



Pillar 2: (Post-)Graduate education

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To strive for:

1. Rigorous, relevant, and forward looking curriculum designed to prepare students for diverse career paths
 - 1.1 Same as UG +
 - 1.2 MS:
 - ▶ Responsivity to industry and state needs
 - 1.3 PhD/Postdoc:
 - ▶ World-class academic preparation
 - ▶ Impactful and groundbreaking research
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 - 2.1 Same as UG +
 - 2.2 MS:
 - ▶ Flexibility to meet students' educational needs
 - 2.3 PhD/Postdoc:
 - ▶ New pathways to role

Pillar 2: (Post-)Graduate education

Strategies, Opportunities, and Challenges:

1. MS:

- ▶ Create new avenues for (4+1): BME? Math?
- ▶ Create portfolios of courses that can lead to certificates
- ▶ Introduce opportunities for MS students to work on research

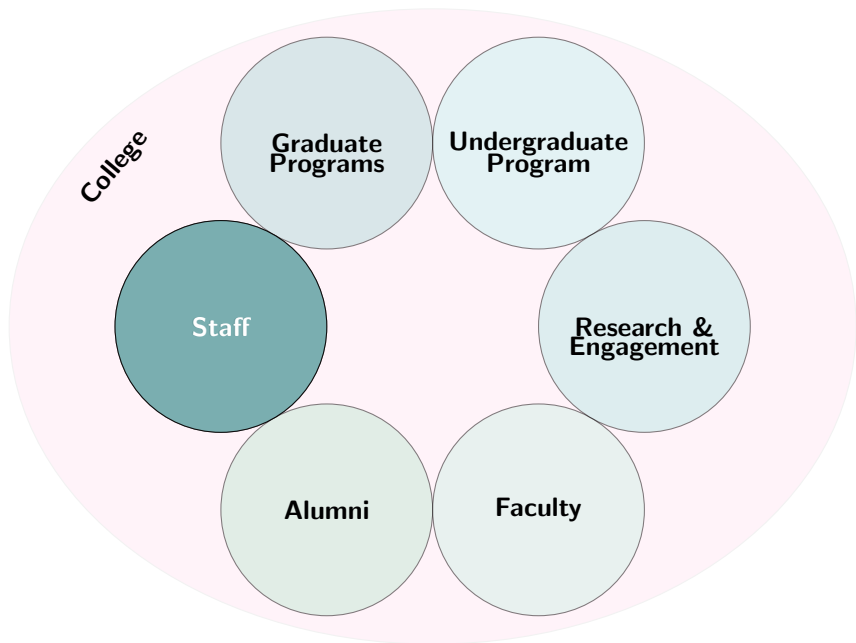
2. PhD:

- ▶ Aggressively seek fellowships and recruit students
- ▶ Ensure that students offers are competitive
- ▶ Provide paths for professional development
 - ▶ Industry-oriented
 - ▶ Academia-oriented
- ▶ Provide alumni mentorship

3. Postdoc:

- ▶ Provide training and resources to develop leadership skills to guide research projects
- ▶ Provide student advising opportunities

Pillars



To strive for:

1. Efficient departmental processes

- ▶ student services,
- ▶ grant and research management,
- ▶ development,
- ▶ student recruitment,
- ▶ communication and public relations,
- ▶ human resources,
- ▶ ...

Pillar 3: Staff

To strive for:

1. Efficient departmental processes

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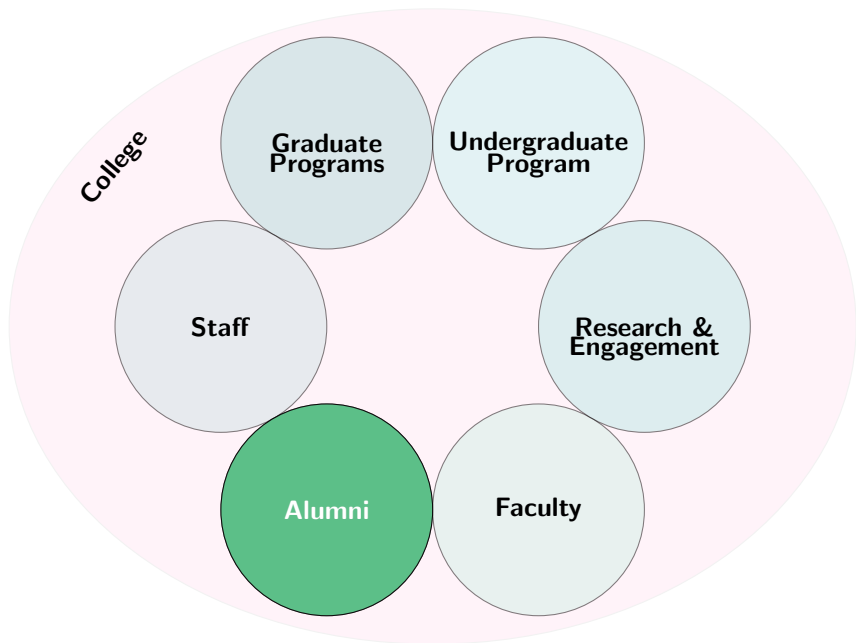
1.1 Committed and long-serving staff members

1.2 Seamless cooperation between faculty and staff

Strategies, Opportunities, and Challenges:

1. Ensure paths for skills and professional development and growth within their own responsibilities
2. Promote professional development activities
3. Stay competitive with external career opportunities
4. Pursue opportunities for recognition
5. Foster alignment with the departmental vision
6. Better involvement within certain departmental functions
7. Streamline communication with faculty

Pillars



Pillar 4: Alumni

To strive for:

1. Global network of alumni influence
2. Engaged alumni willing to support the school

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 - 1.2 Prominent alumni who proudly serve as ambassadors for the program
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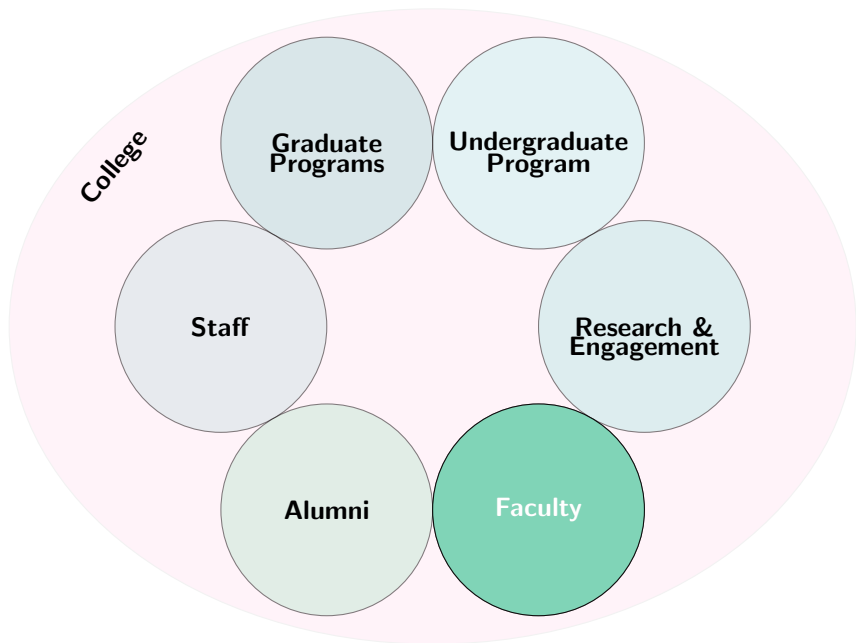
1. Global network of alumni influence
 - 1.1 Deep sense of belonging to the school
 - 1.2 Prominent alumni who proudly serve as ambassadors for the program
2. Engaged alumni willing to support the school
 - 2.1 speakers
 - 2.2 senior design contributors
 - 2.3 mentors
 - 2.4 role models
 - 2.5 fundraisers
 - 2.6 advisors on industry trends
 - 2.7 strategic partners for research and innovation

Pillar 4: Alumni

Strategies, Opportunities, and Challenges:

1. Maintain alumni engagement through:
 - ▶ Alumni networking events
 - ▶ Alumni reunion events
 - ▶ Alumni mentoring programs
 - ▶ Alumni guest speakers
2. Recognize alumni through:
 - ▶ Department awards
 - ▶ Newsletter and social media posts
 - ▶ Involvement with boards
3. Highlight/market how alumni can contribute
4. Keep alumni informed and excited about new developments in the department

Pillars



Pillar 5: Faculty development, retention & recognition

To strive for:

1. Leading faculty with varied world-class expertise
2. Inclusive environment that attracts and retains diverse faculty

Pillar 5: Faculty development, retention & recognition

To strive for:

1. Leading faculty with varied world-class expertise
 - 1.1 Dedicated and engaged within their role
 - ▶ Tenured and tenure-track
 - ▶ Academic faculty
 - ▶ Research faculty
 - 1.2 Diverse in research areas, perspectives, professional backgrounds, and aspirations
2. Inclusive environment that attracts and retains diverse faculty

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 - 1.2 Diverse in research areas, perspectives, professional backgrounds, and aspirations
2. Inclusive environment that attracts and retains diverse faculty
 - 2.1 Effective faculty nurturing and development
 - 2.2 Spirit of cohesion

Pillar 5: Faculty development, retention & recognition

Strategies, Opportunities, and Challenges:

1. Axis 1: Faculty hiring

- ▶ Seek exceptional talent
- ▶ Strengthen traditional areas and expand into emerging fields
- ▶ Provide outstanding mentoring and guidance
- ▶ Keep service and teaching loads reasonable

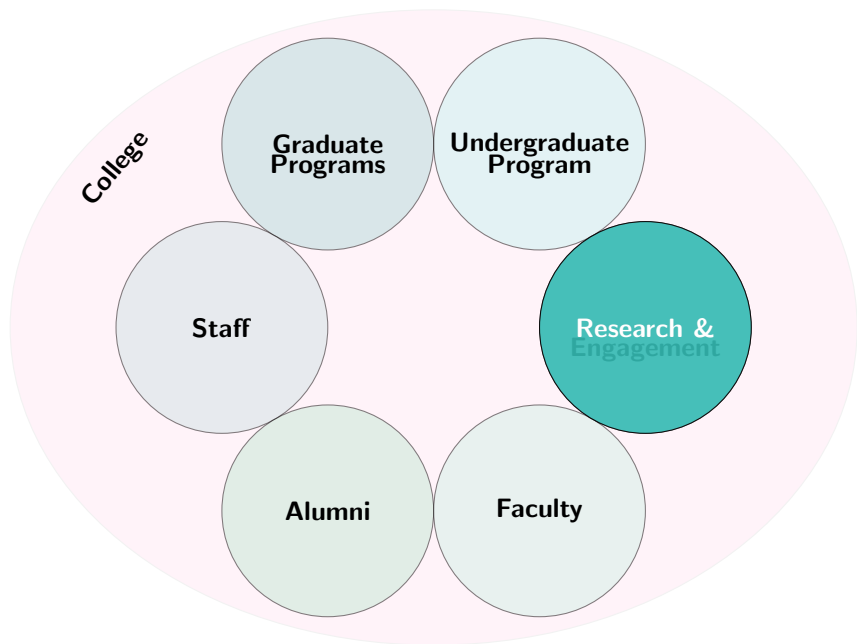
2. Axis 2: Faculty retention and development

- ▶ Provide infrastructure that facilitates faculty's work
- ▶ Share resources and teaching and service assignments fairly and transparently
- ▶ Build a trust that faculty voices are heard
- ▶ Foster community by creating opportunities for shared time
- ▶ Allow faculty to reinvent themselves (development leave)
- ▶ Empower faculty to champion projects that align with and advance the school's mission

3. Axis 3: Faculty recognition

- ▶ Seek recognition for faculty
- ▶ Promote ISyE faculty and achievements broadly
- ▶ Celebrate student placements and other achievements

Pillars



Pillar 6: Research

To strive for:

1. Strong culture of academic and research freedom and excellence
 - 1.1 Cutting-edge research of the highest caliber that is recognized worldwide
 - 1.2 Deep expertise
 - ▶ methodological
 - ▶ topical
 - 1.3 Consistent research productivity and publications in top outlets
 - 1.4 Strong, steady, and varied sources of external funding
2. Strong engagement with important and societal problems

Pillar 6: Research

To strive for:

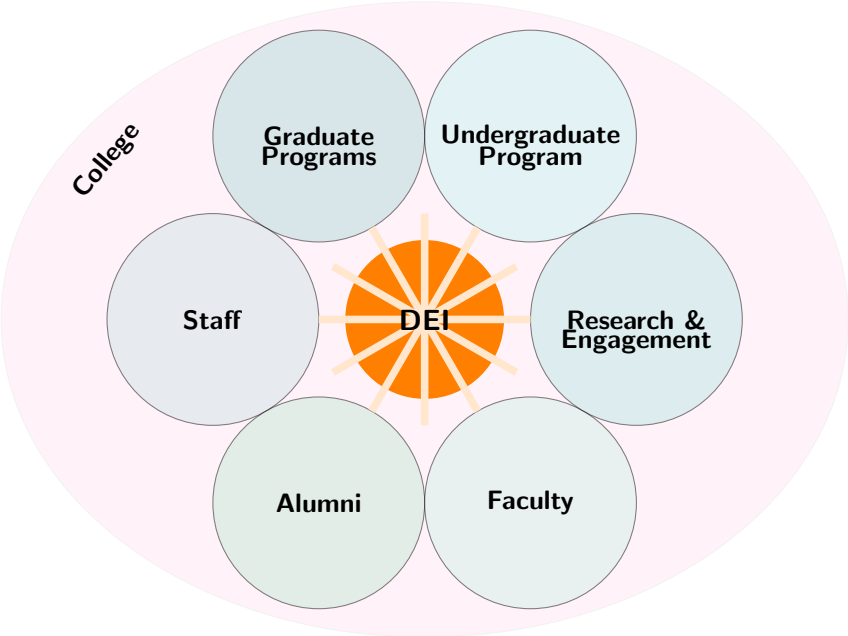
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2. Strong engagement with important and societal problems
 - 2.1 Robust collaboration with industry
 - 2.2 Strong integration of research within college and university themes

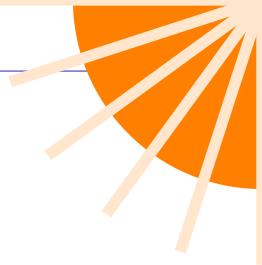
Pillar 6: Research & Intra-University Collaborations

Strategies, Opportunities, and Challenges:

1. Create mechanisms for empowering faculty to pursue new or collaborative research
 - ▶ Explore development leave
2. Host research forums around emerging themes
 - ▶ within the school
 - ▶ outside of the school
3. Market ISyE to and develop synergies with other entities within the university:
 - ▶ Engage with department chairs.
 - ▶ Organize get-to-know seminars.
4. Develop lasting partnerships with industrial collaborators
 - ▶ Leverage Atlanta's industrial ecosystem:
 - ▶ Leverage entry points in senior design/capstone:
5. Assess potential hiring areas to strengthen connections with the college and the university.
6. Recognize and value collaboration.

Pillars





Recognize that:

1. Welcoming environments help broaden participation
2. Diversity multiplies opportunities to learn and grow
3. Diversity is multi-dimensional
4. Challenges exist and have differentiated effects

To strive for:

1. Removing barriers & mitigating bias
2. Expanding opportunities & developing pipelines

Strategies, Opportunities, and Challenges:

1. Use inclusive practices to best recruit and retain diverse talent.
2. Develop and deploy inclusive teaching and learning practices.
3. Provide opportunities for training and professional development.
4. Ensure that visible functions in the department reinforce that individuals with diverse backgrounds, views, and characteristics belong to the community.
5. Engage with local communities, particularly those underrepresented in ISyE.

Fundraising and development

To strive for:

1. Secure sustainable, high-impact funding that supports cutting-edge research, innovative student programs, endowed faculty positions, and strategic partnerships

Strategies, Opportunities, and Challenges:

1. Build the community
2. Tie request to goals donors can relate to
3. Make donating easy
4. Cultivate relationship with major donors
5. Demonstrate the fundraising impact in both qualitative and quantitative ways

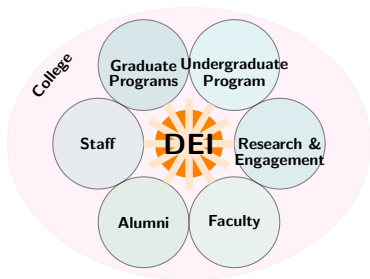
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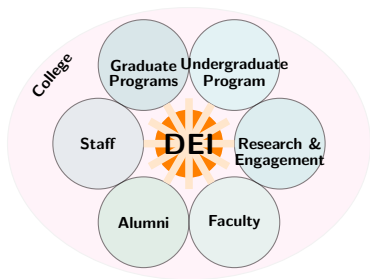
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How to get there?



The key is unleashing the potential of people (Faculty, Students, Staff, Alumni) and creating processes and resources that effectively support them in achieving a shared vision

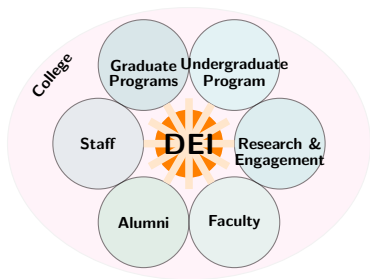
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Leadership is not about being the best. Leadership is about making everyone else better.

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Questions?