The Mandra of Graduate Education Reform: Why the Prayers Aren't Answered

Michael T. Ashby

Department of Chemistry and Biochemistry

University of Oklahoma

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But the foundation of the apprentice model for graduate educations is the pairing of a teacher with a single student.

Some Reasons Why Assessment of Ph.D. Programs is Problematic

1. By definition, the “curriculum” used to train a Ph.D. is unique (the population is highly heterogenous).
2. Faculty are resistant to experiment with new approaches to training graduate students (graduate education is steeped in tradition).
3. The IRB has determined that graduate students meet the criteria of an “at risk” population.
4. We simply do not have the tools.

Two Vignettes

- **The 10,000 foot view: national studies on the future of graduate education**

- **The 1 foot view: individual students**

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There Has Been One or More National Study on the Future of Graduate Education Every Year For the Past Three Decades!

1995. National Research Council. Reshaping the Graduate Education of Scientists and Engineers.
1998. AAU Committee on Graduate Education. Report and Recommendations.
2005. Woodrow Wilson Foundation. The Responsive PhD: Innovations in U.S. Doctoral Education.
2005. NRC. Policy Implications of International Graduate Students and Postdoctoral Scholars in the US.
2006. Carnegie Initiative on the Doctorate, Envisioning the Future of Doctoral Education.
2007. National Research Council. Rising Above the Gathering Storm.
2009. National Research Council. A New Biology for the 21st Century.
2009. Council of Graduate Schools. Broadening Participation in Graduate Education.
2010. National Research Council. Rising Above the Gathering Storm Revisited.
2010. CGS. PhD Completion and Attrition: Policies and Practices to Promote Student Success.
2010. CGS and Educational Testing Service. The Path Forward: the Future of Graduate Education in the US.
2012. National Research Council. Research Universities and the Future of America.
2012. American Chemical Society, Advancing Graduate Education in the Chemical Sciences.
2012. National Institutes of Health. Biomedical Research Workforce Working Group Draft Report.
2012. CGS and the Educational Testing Service. Pathways Through Graduate School and into Careers.
2013. American Chemical Society. ACS Graduate Student Survey. Washington, DC.
2013. NST Council. Federal Science, . Engineering, and Mathematics Educ. 5-Year Strategic Plan.
2014. National Research Council. The Postdoctoral Experience Revisited.
2015. Council of Graduate Schools. Doctoral Initiative on Minority Attrition and Completion.
2016. Mellon Foundation. Reforming Doctoral Edu., 1990 to 2015 Recent Initiatives and Future Prospects.
2017. CGS. Professional Development: Shaping Effective Programs for STEM Graduate Students.
2017. NAS, Revitalizing Graduate STEM Education for the 21st Century
2018. NAS, Board on Higher Education and Workforce. Revitalizing Grad. STEM Educ. for the 21st Century.

Common Denominators: Time to Degree

The Path Forward: The Future of Graduate Education, Commission on the Future of Graduate Education in the United States, 2010: "… the public and private costs of a longer-than-necessary time to degree completion, and the benefits to the public and to the individual recipient of a degree awarded, mean that students should complete as efficiently as possible."

Advancing Graduate Education in the Chemical Sciences, American Chemical Society, 2012: "Four years should be the target for completion of the Ph.D. degree …"

Biomedical Research Workforce Working Group Report, National Institutes of Health, 2012: "To encourage timely completion of graduate degrees, NIH should cap the number of years a graduate student can be supported by NIH funds … with an institutional average of 5 years."

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Common Denominators: Broaden Experience

The Path Forward: The Future of Graduate Education, Commission on the Future of Graduate Education in the United States, 2010: "A professional development component is one of the strengths of graduate education. However, it is primarily master's level programs, not doctoral, that have included this component. Universities should support the acquisition of such transferable skills to prepare doctoral recipients for a larger array of employment opportunities."

Advancing Graduate Education in the Chemical Sciences, American Chemical Society, 2012: "… curricula need to be refreshed, and better-designed opportunities should exist for the development of critical professional skills"

Pathways through Graduate School and Into Careers, Council of Graduate Schools, 2012: "Broaden the focus of graduate education to include development of professional skills."

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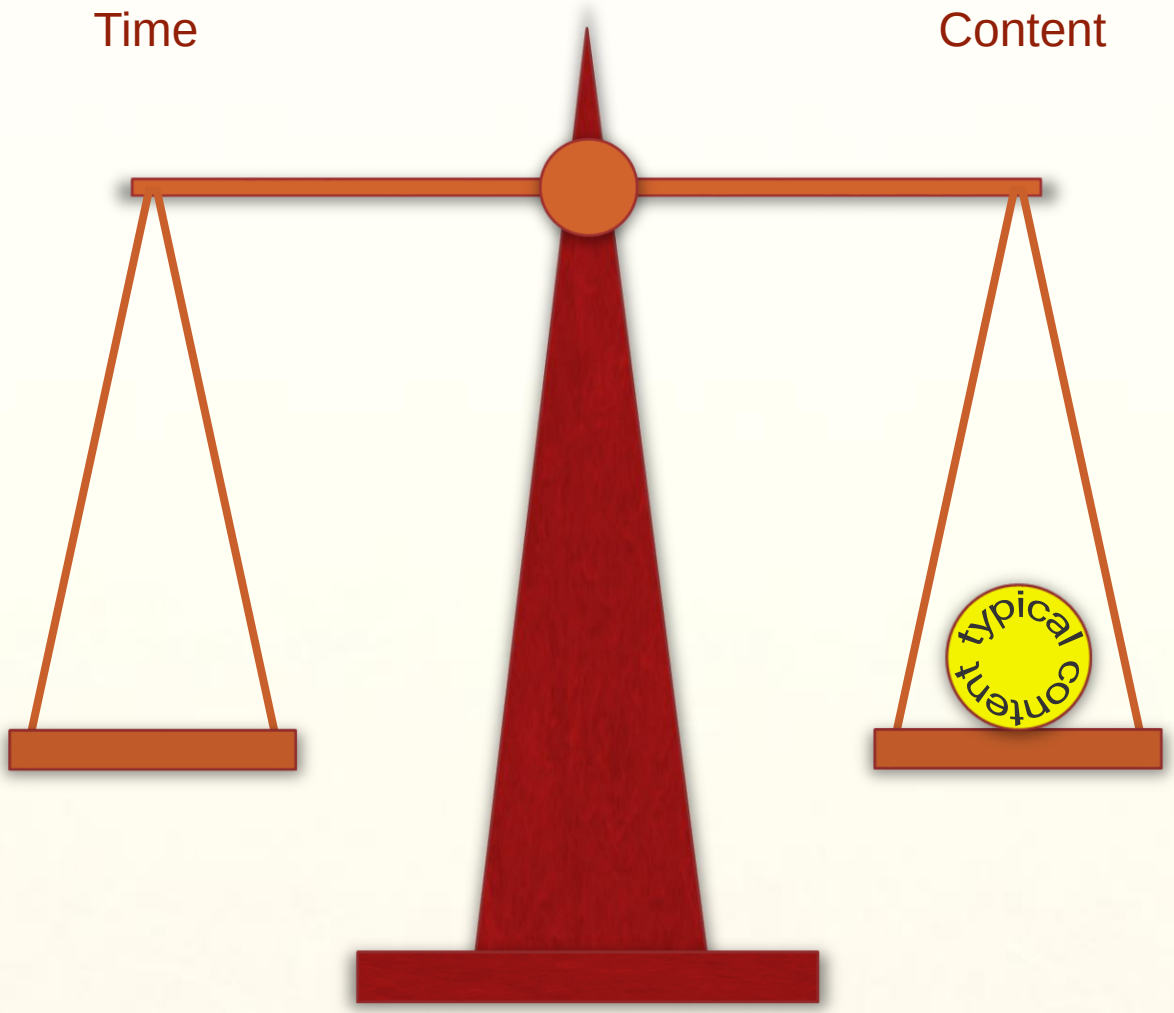
Must Be Treated As Commodities



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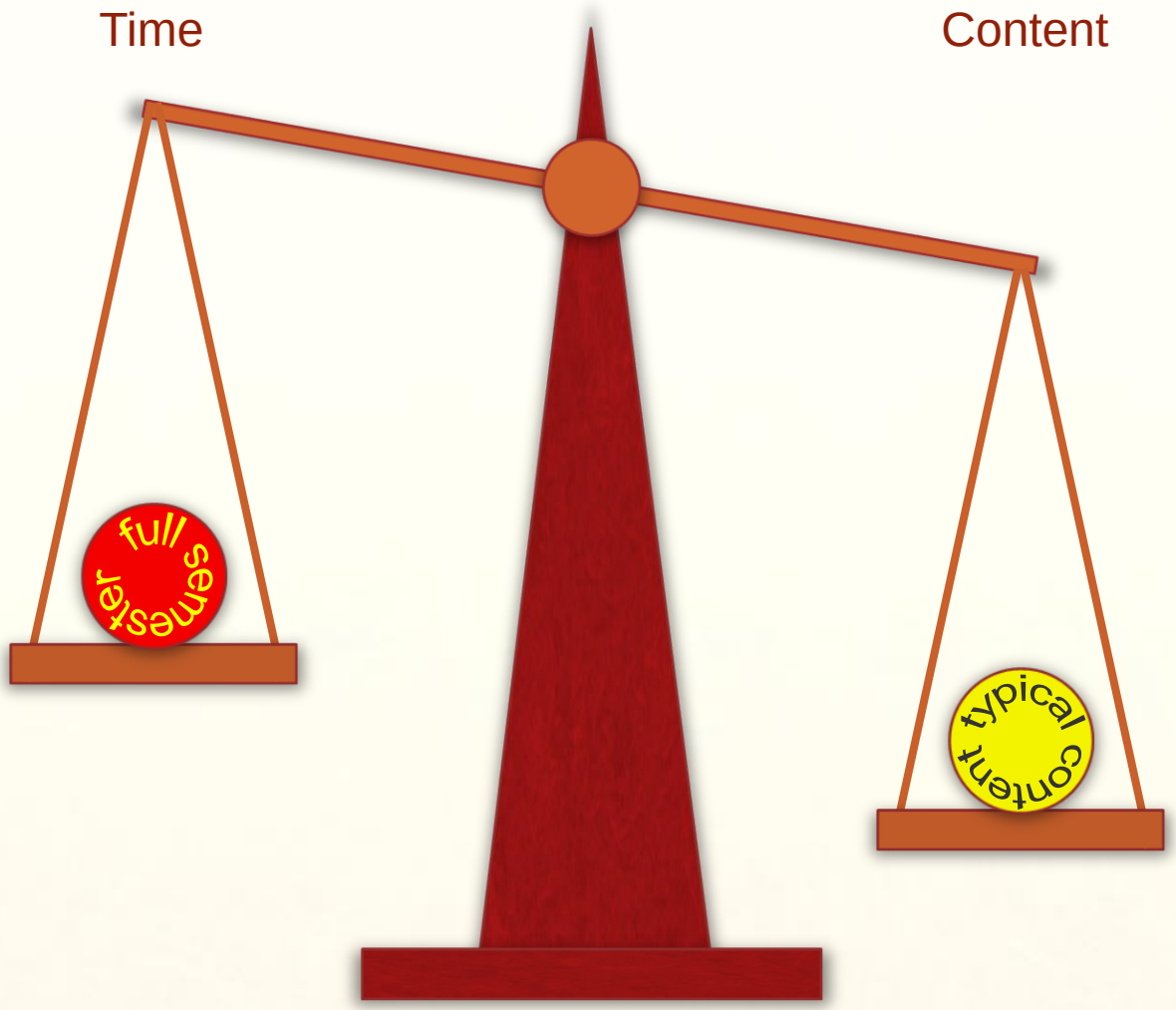

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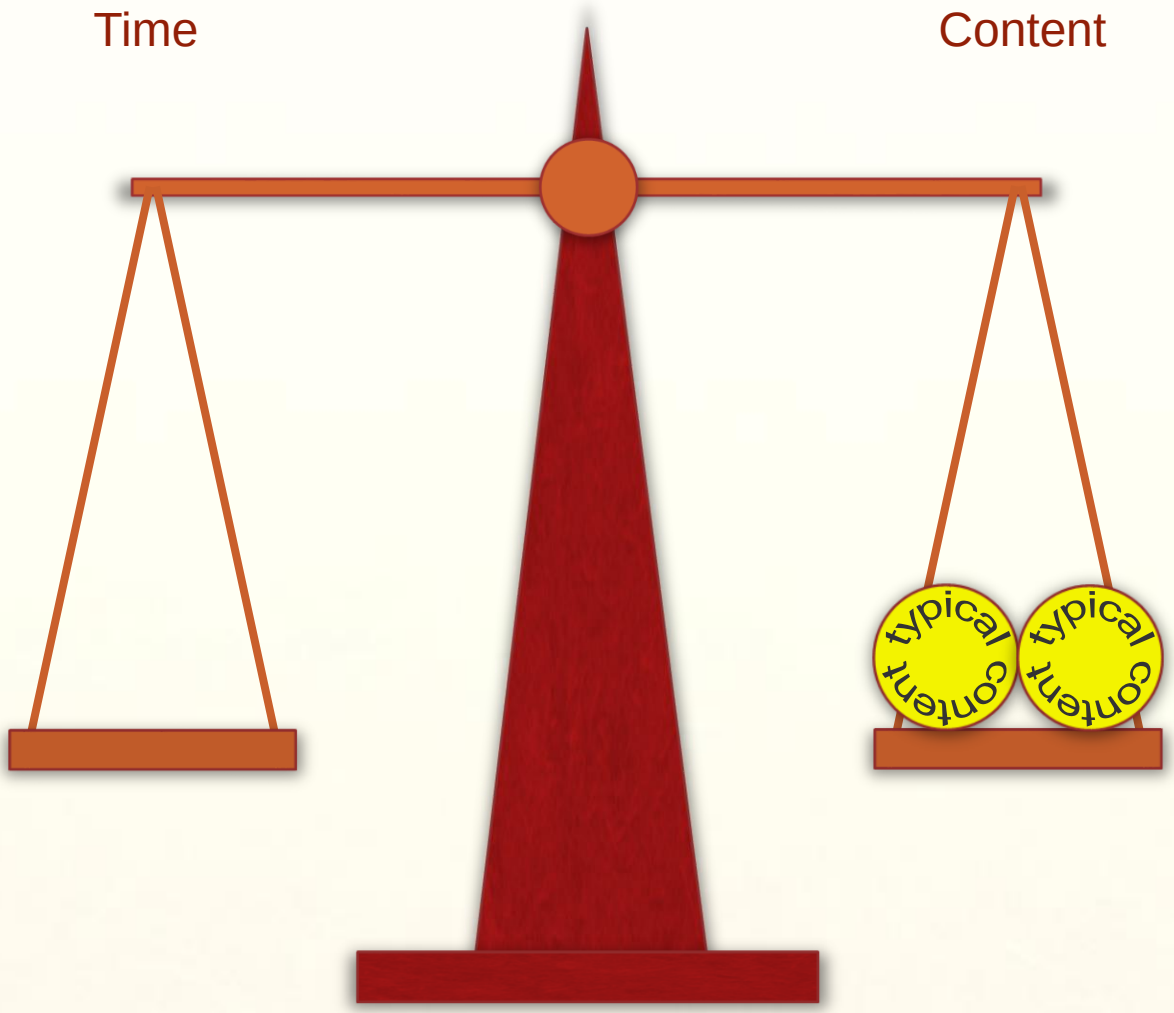

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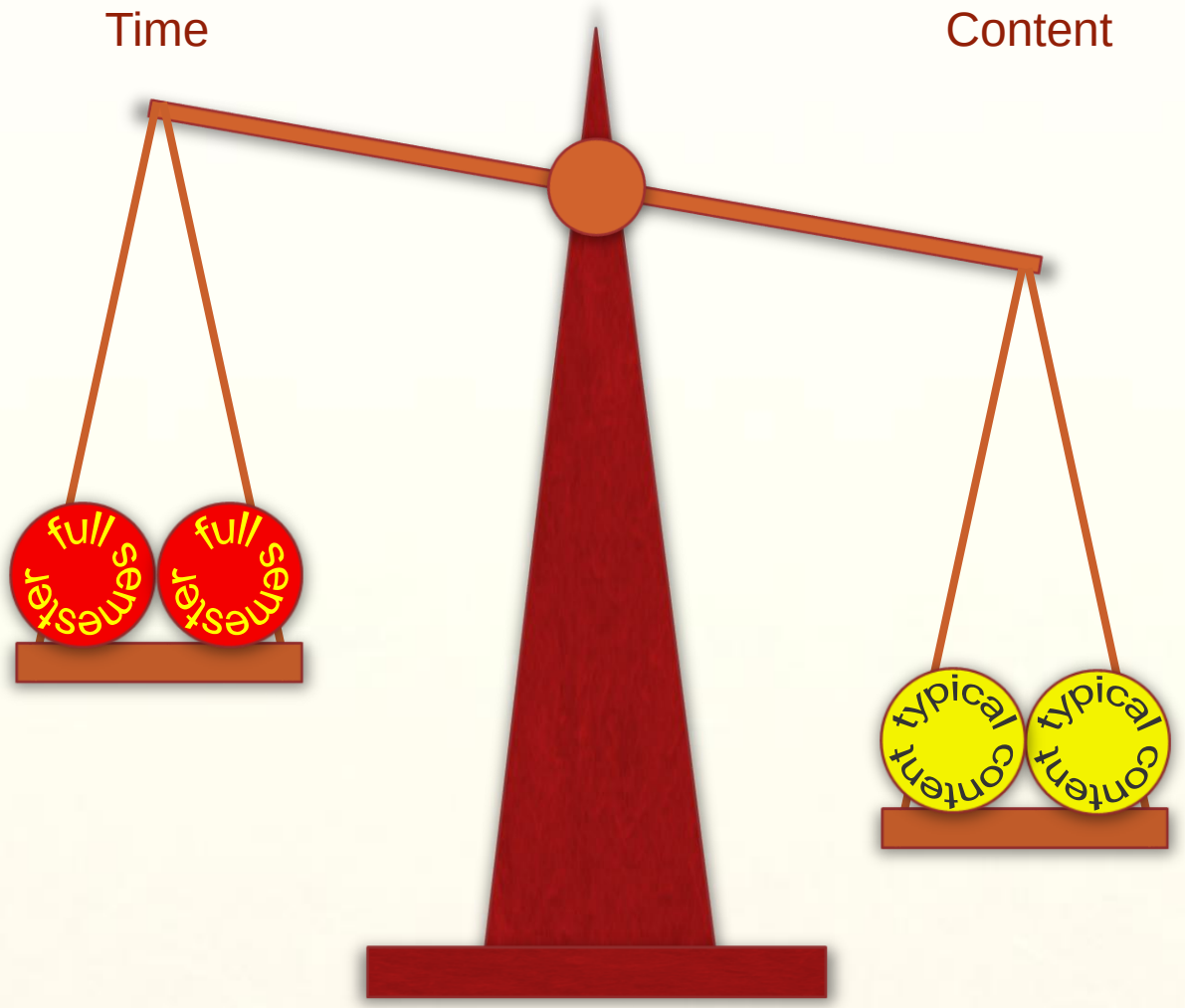


My first question.

From the perspective of …

1) Your discipline (e.g., history, biology, chemical engineering …)

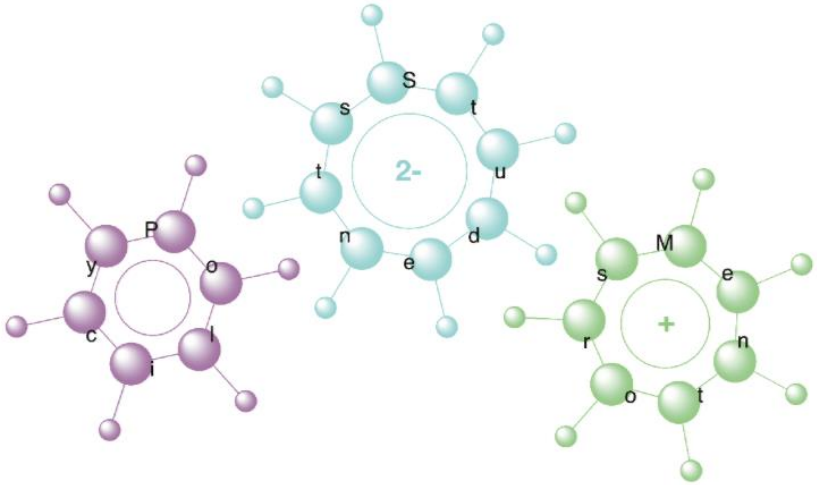
2) Your role in graduate education (e.g., graduate student, postdoctoral, faculty member, department chair, …)

Should the time to degree be reduced from its current average (in your field) by twenty-five percent?

- ☐ Most important to advance graduate education
- ☐ Less important to advance graduate education
- ☐ Do not agree with the recommendation

http://chemistry.graduate.education

Working Together to Advance Graduate Education in the Chemical Sciences



CALL TO ACTION

Help prioritize the recommendations of the ACS study:

Advancing Graduate Education in the Chemical Sciences

Complete the Survey

http://chemistry.graduate.education

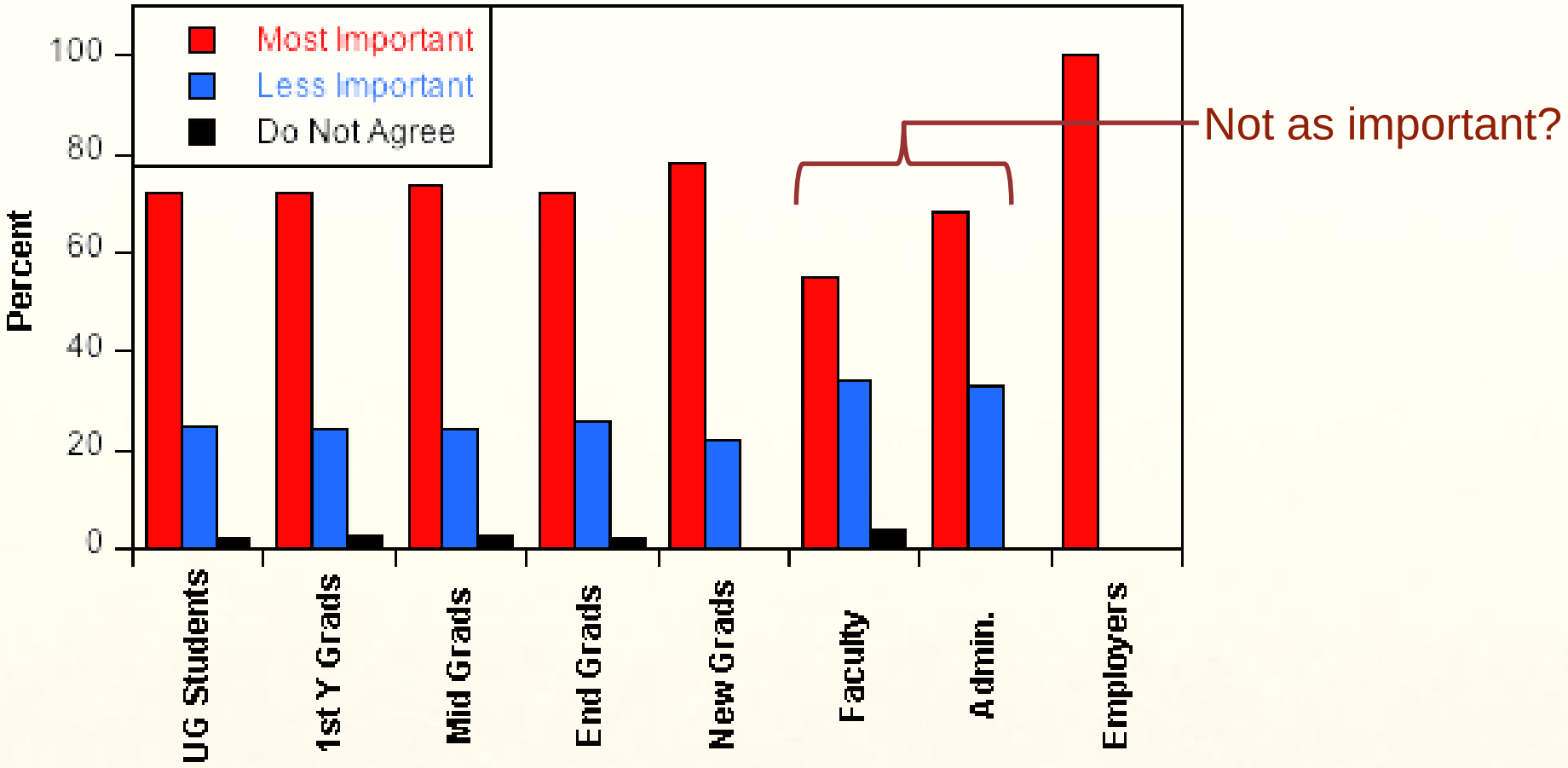
- Outside the twenty-two members of the ACS commission that drafted the 2012 report, the community has not until now been queried as to whether they agree with their recommendations.

- We recently asked the entire community of stakeholders of chemistry doctoral education—undergraduates who plan to go to graduate school, graduate students in various stages of their studies, recent graduates and postdoctoral fellows, faculty, administrators, and employers —to indicate their level of support for the 32 recommendations of the ACS study.

- More than 1300 responses were received.

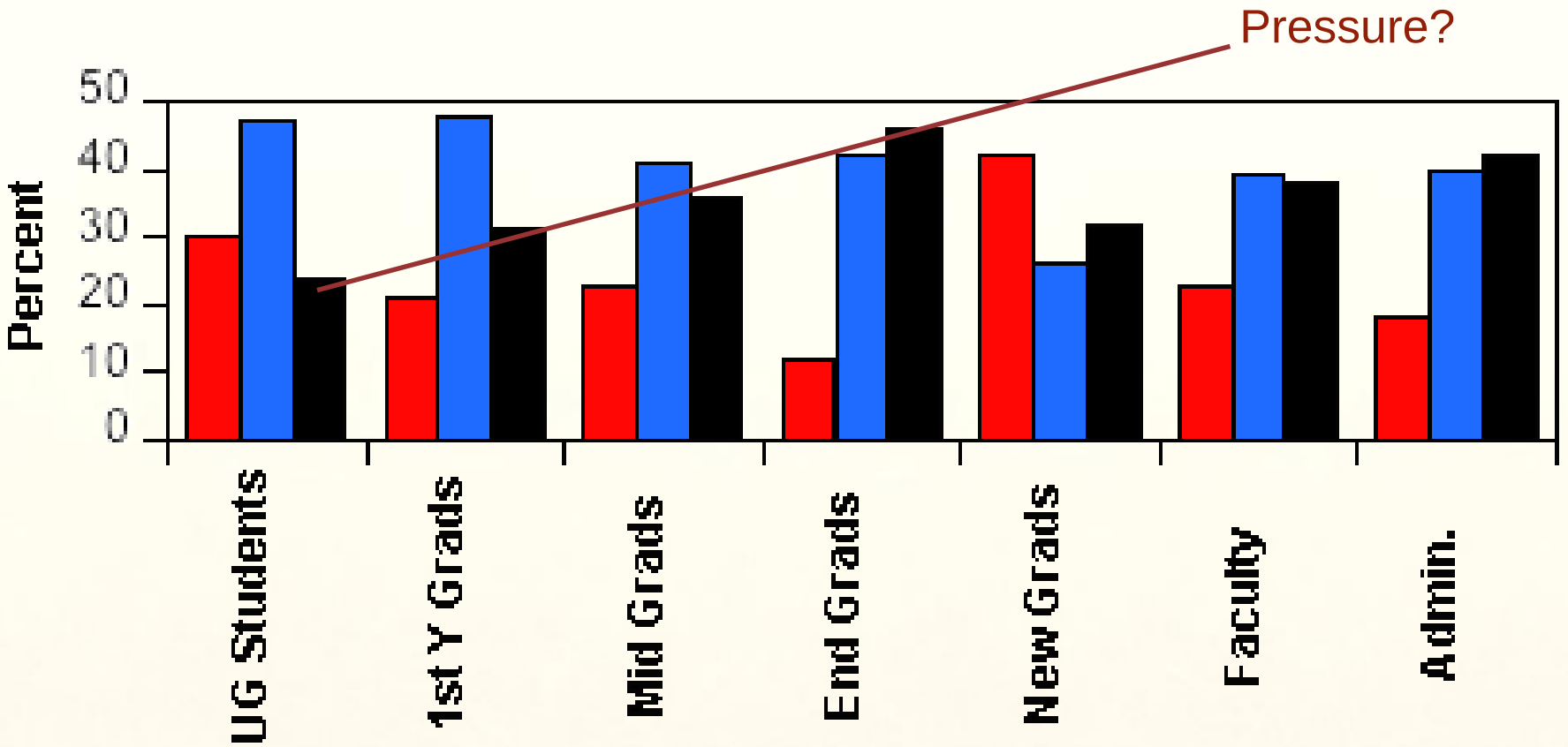
Some of the recommendations are universally popular.

Additional professional skills should be incorporated into graduate curricula.



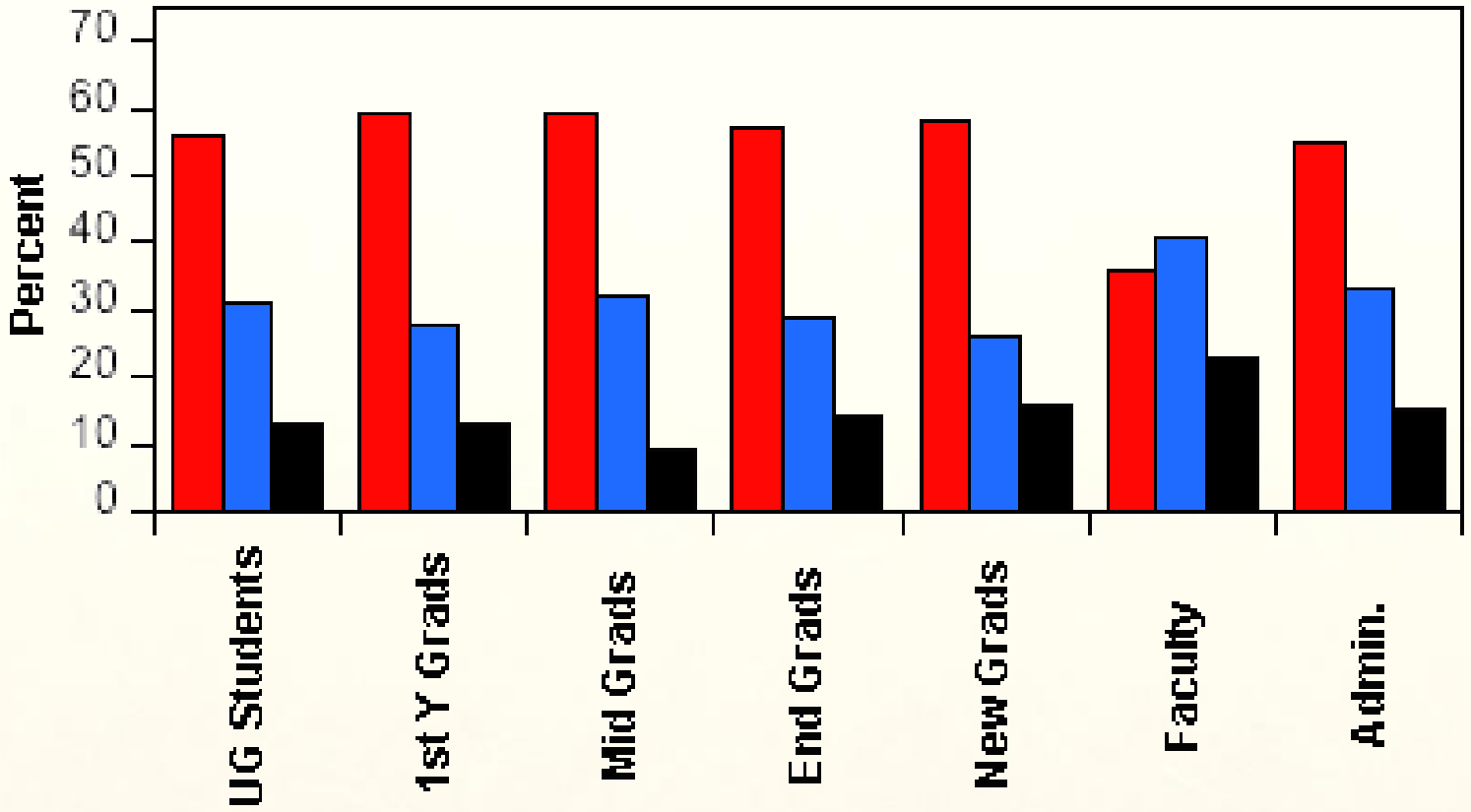
Some of the recommendations are not popular.

Require at least two research proposals, at least one in the student's field.



Faculty/mentors are sometimes out of step.

The current time to degree of 6-7 years should be shortened to less than 5.



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By relaxing the rigors of education?

My first question.

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Should the time to degree be reduced from its current average (in your field) by twenty-five percent?

By relaxing the rigors of education?

By reducing research productivity?

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1) Your discipline (e.g., history, biology, chemical engineering …)

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Should the time to degree be reduced from its current average (in your field) by twenty-five percent?

By relaxing the rigors of education?

By reducing research productivity?

By eliminating the use of graduate students as teaching assistants?

My first question.

From the perspective of …

1) Your discipline (e.g., history, biology, chemical engineering …)

2) Your role in graduate education (e.g., graduate student, postdoctoral, faculty member, department chair, …)

Should the time to degree be reduced from its current average (in your field) by twenty-five percent?

By relaxing the rigors of education?

By reducing research productivity?

By eliminating the use of graduate students as teaching assistants?

By making students work seven day a week and 360 days a year.

A parting thought regarding the first vignette.

A plethora of national studies of graduate education over the past two decades has yielded similar recommendations for reform, but very little action.

Reform is unlikely unless the pains and needs of each stakeholder group are recognized and addressed - including, and especially, those of students.

Herein lies a fundamental challenge: graduate students and early-career faculty are not forthcoming when asked to critically evaluate graduate education.

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3. The IRB has determined that graduate students meet the criteria of an “at risk” population.
4. We simply do not have the tools.

My second question.

If you are a graduate student, by what means do you convey your needs to the faculty?

If you are a faculty member, how do you know you are meeting the educational needs of your graduate students?

Approached we have taken.

1. We have formalized the use of Individual Development Plans during the annual graduate student evaluation process.

2. We have augmented the “apprentice model” of mentoring Ph.D. with a community approach.

3. We have implemented an annual “graduate student summit” so that concerns can be voiced with anonymity

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Individual Development Plans

myIDP (https://myidp.sciencecareers.org) – is a career-planning tool tailored to meet the needs of PhD students and postdoctoral scholars in the sciences, with an emphasis on the biological sciences. The Federation of American Societies for Experimental Biology (FASEB) first proposed the project in 2003 and it is currently supported by the American Association for the Advancement of Science's (AAAS).

Individual Development Plans

ChemIDP (https://chemidp.acs.org) – is designed specifically for graduate students and postdoctoral scholars in the chemical sciences. The development of ChemIDP was supported by the National Science Foundation Innovation Corps (I-Corps) Teams Program and the American Chemical Society (ACS) Board of Directors.

Individual Development Plans

ImaginePhD (https://www.imaginephd.com) – is designed specifically for graduate students and postdoctoral scholars in the humanities and social sciences. The ImaginePhD project is supported by the Graduate Career Consortium (GCC).

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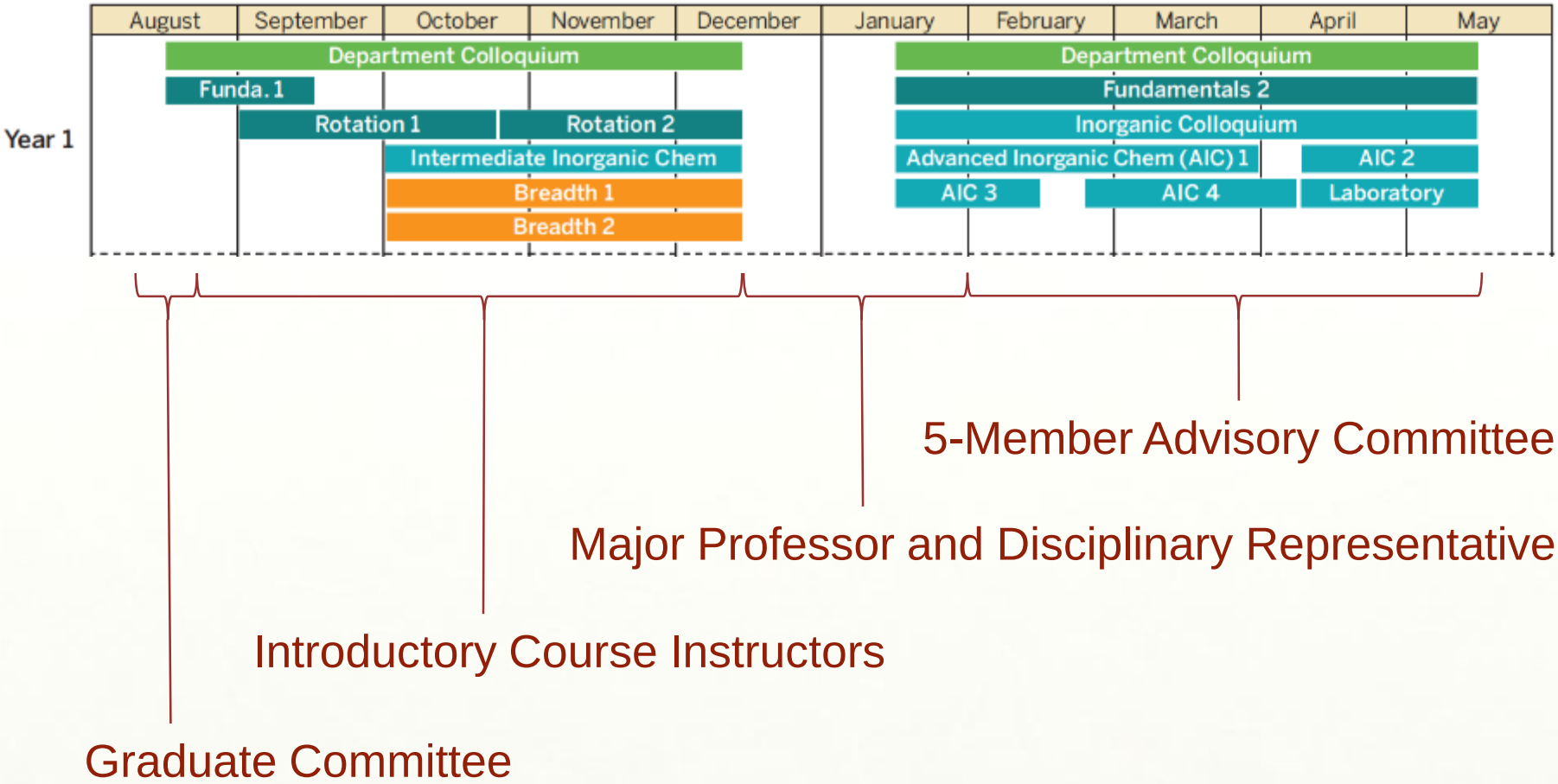
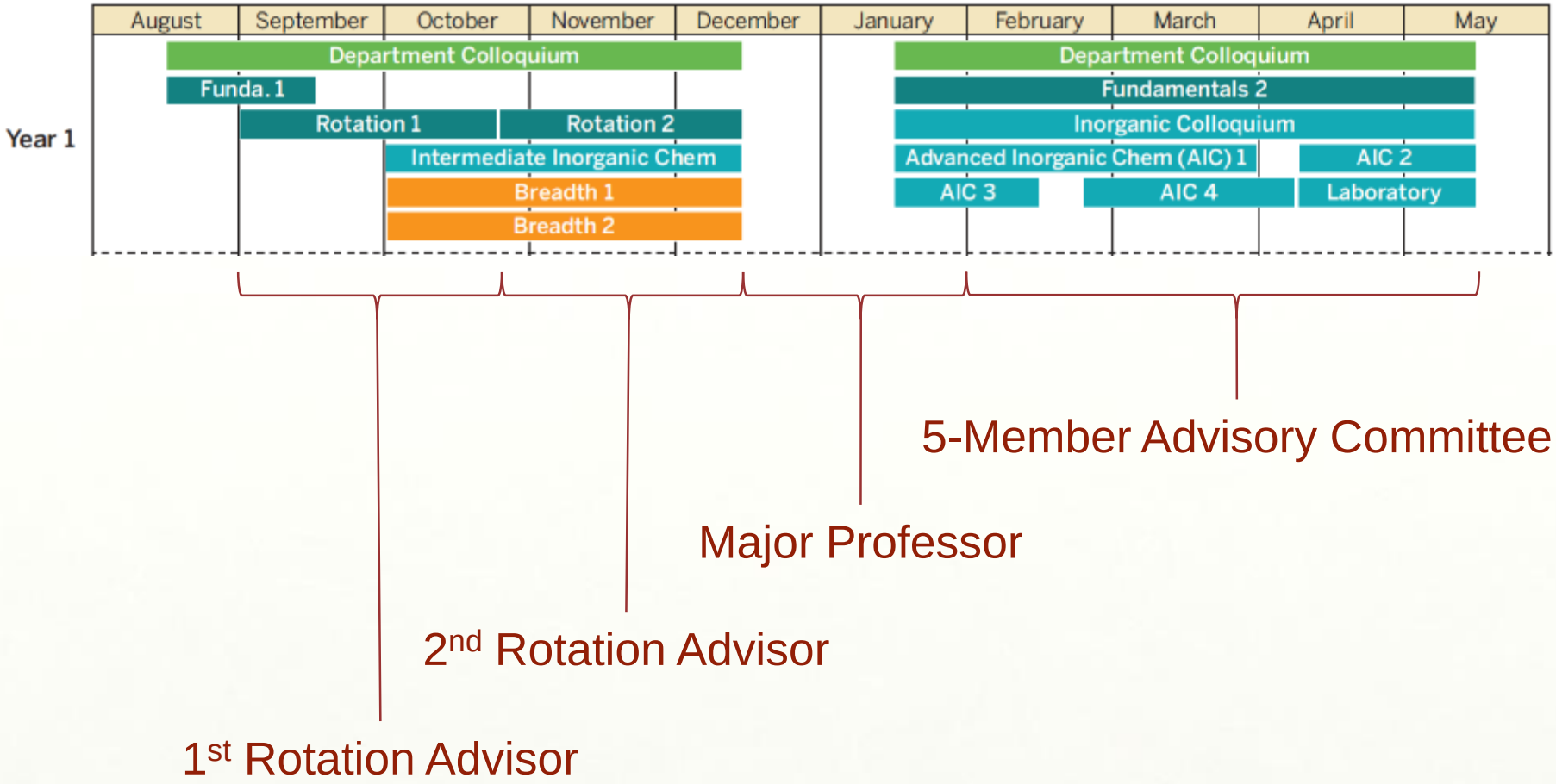
Academic Mentoring During the 1st Year



Research Mentoring During the 1st Year



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