

Successful advising of students at the graduate level is driven primarily by effective and efficient mentoring. The cornerstones of mentoring are (1) mutual respect and trust between student and faculty, (2) communal sharing of experiences, (3) problem identification and resolution within least possible time, (4) establishment of win-win relationship between student and faculty, and (5) desire and commitment of faculty to bring to the table and to give more than the student.

**Mutual respect and trust:** I express directly to graduate students performing research with me that their research skills and interpersonal attributes are enablers (gifts) that they bring to the community of scholars in my research teams. These gifts are foundational and with guidance and support *from and by me* ensure a successful research experience. I ask graduate students performing research in my teams to engage in a partnership with me where the opportunity space for success goes beyond technicalities of research to include the whole persons of the partnership. If my students are challenged, I am also challenged; if I am challenged, my students are likewise challenged. It is a partnership based on mutual respect and trust that resolves the challenges.

**Communal sharing of experiences:** Best practices based on time honored and shaped experiences are openly and directly shared with students performing research in my teams. There must never be a hidden curriculum. Transparency within an environment of critique with useful and executable recommendations is practiced and maintained. Our research teams are living, learning enterprises that retain and expand knowledge by sharing experiences. Sharing occurs through students giving seminars regularly with a requirement that *each student and I* offer critique with recommendations. Seminar presentations as well as research papers, analytical, computational, and experimental state of the art tools are stored in the team's Drop Box for community access. Our community is never a no-praise zone.

**Problem identification and resolution:** Each member of the partnership is encouraged to present well-posed challenges to me or to the entire team. Such challenges may be related to research or outside external challenge. Challenges resolution is encouraged by me to close as soon as possible. I stress "zero-cycle time" for challenge resolution to mitigate student stress thereby advance the team's objective for greater research achievement. *Vires et Honestas.*

**Win-win relationship:** I reinforce the concept that the student performing research with me is fully respected and is in a win-win relationship with me performing as her/his research advisor. My student wins by generating new knowledge in the discovery process expressed in archival publications and a MIT quality SM/PhD thesis. The win for me takes the form of continued service as a steward of the discipline. The incarnated quality of the win-win relationship is transformative, not transactional. Keeping a score card has no place in generating and caring for knowledge. The "win-win" is what's important and trumps an individual win.

**Faculty desire and will:** Initially the power balance favors the faculty member in the partnership. Hence, it is incumbent upon me to reach out to my students and convince her/him of the goals and rewards of an effective and efficient mentorship. In so doing, I must recognize, accept, respect, and nurture the *full and complete dimensions* of my student. Also, I must be able to assess the path to developing and maintaining an effective and efficient mentoring relationship with my students. If necessary, I will make corrections and extensions to ensure the development of the desired mentorship relation. The whole is greater than the sum of its parts.

## Harris Research Groups

### Research Foci

1. Hypersonics
  - a. Plasma wake modeling and analyses
  - b. Shock wave-boundary layer interaction
  - c. Heat transfer, wall cooling via liquid metals
  - d. Fine scales in hypersonic turbulent boundary layers
  - e. Scramjet flame modeling and analyses
2. Bio-fluid dynamics
  - a. Sickle cell crisis modeling
  - b. Hemorrhage mitigation using magnetorheological suspensions

### Frequency and Style

1. Weekly team meetings
2. Meetings with individual graduate student researchers as requested
3. Dinner meetings with teams, at least twice per semester

### Culture

1. Group size: 6 to 8 graduate students
2. Guidance provided through team and individual team member meetings
3. UROPs are encouraged
4. Publication of meaningful research results is expected
5. Summer industry internship is encouraged
6. Conference attendance and paper presentation is expected
7. Non-academic professionals serve on student doctoral committees
8. Advanced graduate students are expected "to train" incoming graduate students