ME Teaching Assistant Training & Orientation

Edward Berger
Professor of Engineering Education
and Mechanical Engineering
Executive Director, MEERCat Purdue Research Center

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Today's agenda

1. Understanding expectations (yours, your students', your professors')
2. Professionalism and your role in representing the ME department
3. Grading and rubrics
4. Academic integrity
5. Links to resources

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You may be asked/required to do...

In the classroom:

- Attend lecture
- Support/assist the instructor
- Conduct review sessions

In office hours:

- Support student conceptual and procedural skills
- Nurture their resourcefulness and independence

In the lab:

- Nurture students' curiosity
- Foster their independence and problem solving
- Troubleshoot equipment

While grading:

- Apply a rubric in a fair and consistent manner
- Develop solutions/answer keys

Potentially other duties as assigned.

Know Purdue/ME community standards

Purdue policies and expectations

- Professionalism: Purdue Graduate Staff Employment Manual (especially the 'General Policies' section)
- Academic integrity: Purdue OSRR, Purdue Honor Pledge
- Policy and process: grade appeals (Purdue engineering grade appeals guidance)
- Student rights about their educational records: FERPA

Local/ME policies and expectations

- Read the syllabus carefully
- Know the course/instructor expectations about grade appeals, allowable forms of collaboration, etc.

Know Purdue/ME community standards

Purdue policies and expectations

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Local/ME p

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Public Posting of Grades (FERPA)

The public posting of grades, either by the student's name, institutional student identification number, or social security number is a violation of FERPA. Using an assigned random number that only the student and instructor know would be an appropriate way to post grades. Even then, the order of posting should not be alphabetic.

Professionalism

TAs play a critical role in our educational enterprise.

You are a very ‘public face’ of ME’s values, and your behavior conveys an important message to our students.

- Do we care about them?
- Do we want them to learn and succeed?
- Do we challenge them, while also being encouraging?

You have responsibility, authority, and accountability to convey positive messages to our students through your actions.

Professionalism

When interacting with students:

- Be respectful, collegial, encouraging, and focused on their development.
- Establish your authority, but balance it with approachability.
- Do not use highly idiomatic English, or excessive jargon.
- Recognize that cultural differences definitely exist, especially around classroom behavioral norms and response to authority.
- Coach students to understand/find ‘the answer’ rather than telling them directly.
- Always be on time, prepared, and ready to support student learning.
- Manage personal relationships appropriately.

Professionalism

When interacting with instructors (and others on the instructional team):

- Always be on time, prepared, and ready to understand your role in supporting student learning and achieving the objectives of the course.
- Listen, and seek clarification when needed.
- Understand (and confirm) your actions items and deadlines.
- Provide feedback about what you see/experience when engaging with students. (For instance, is there a specific concept that students seem to be struggling with or asking about in office hours?)
- Coordinate with other course TAs so that you all understand tasks lists, deadlines, and distribution of responsibilities.

Professionalism

When reflecting on your role and performance: To what extent have I...

- ...been on time, prepared, and ready to understand my role in supporting student learning and achieving the objectives of the course?
- ...completed my tasks by the stated deadline?
- ...managed my time and balanced my TA activities with the rest of my academic or research expectations?
- ...balanced authority with approachability when engaging with students?
- ...respected cultural differences and managed them appropriately?

Professionalism

What are some effective ways to prepare?

- Review the material, specific examples, laboratory exercises, etc. so that you are entirely confident about your understanding.
- Know the ‘right way’ to do things, but anticipate ways in which students might struggle, hold misconceptions, or make procedural mistakes.
- In settings like a review session, over-prepare (prepare more examples than you think you can use in the time allotted).
- Coordinate with other TAs to compare experiences with students, their misconceptions, etc.

Professionalism checklist

- ❑ Be on time, prepared, and ready.
- ❑ Support student learning by helping them build their curiosity, resourcefulness, and independence.
- ❑ Convey the message that you are approachable and helpful.
- ❑ Be alert for academic integrity violations and report them to your instructor.
- ❑ Manage personal relationships with students appropriately.
- ❑ Respect FERPA and maintain student privacy.

Professionalism scenarios

1. You are one of the TAs for ME 200 (Thermodynamics). The instructional team holds a regular meeting on Monday at 9 am. One of your TA colleagues has not shown up for the meeting, nor has he completed grading something that was assigned to him. What action(s) can you take during the meeting to support your TA colleague?

- Call or text your colleague to see where he is, why he is late (is he sick?), and why he did not complete his tasks on time.
- Offer to complete his task (either yourself, or in collaboration with other TAs).
- Take good notes of the team meeting and share them with your colleague.
- The goal is to build an instructional team based upon trust, shared goals, and each team member understanding and meeting expectations.

Professionalism scenarios

2. You are one of the TAs for ME 385 (Systems and Measurements). A student in the lab is struggling with a measurement. What kinds of question(s) can you ask to assess the situation and support the student's learning?

- Can you explain to me what you've done so far? (Assess whether their earlier work is correct or demonstrates understanding of the fundamentals.)
- What do you think the correct next step might be, and why? (Assess the student's intuition, and rationale--be sure to ask 'why'.)
- How do you think the measurement is supposed to turn out? (Assess the students understanding of the goal of the experiment.)
- The goal is to identify whether the student's struggles concern conceptual or procedural knowledge, the hardware/software, or some other issue.

Professionalism scenarios

2. You are one of the TAs for ME 385 (Systems and Measurements). A student in the lab is struggling with a measurement. What kinds of question(s) can you ask to assess the situation and support the student's learning?

It is rarely (!) appropriate to simply 'tell the student the answer'. You should routinely ask them questions like these to assess their gaps in understanding. It ***may*** be appropriate in the narrow case of a hardware problem.

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- intuition, and rationale--<u>be sure to ask 'why'</u>.)
- How do you think the measurement is supposed to turn out? (Assess the students understanding of the goal of the experiment.)
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Grading: DISCLAIMER

- Grading can be done in many different ways, to achieve many different purposes. There is no one ‘right’ grading philosophy or process. Approaches to grading are highly contextual.

- Grading practices in ME courses are a function of history, instructor habit/preference, and the needs of the course.

- As such, your responsibility is to understand the expectations, philosophies, and specific practices of grading student work in your assigned course, as defined by the instructor(s) and/or senior TAs.

Grading: philosophy

- Because grading is contextual, you can ask many questions about a graded assignment:
  - Am I grading for process/procedure (solution) or final outcome (answer)?
  - Do I care about conceptual knowledge (does the student understand the concept) or procedural knowledge (can they apply it to this problem)?
  - Is this a high-stakes (final exam) or low-stakes (quiz) assessment?
  - Are there elements of this problem that I will not grade? For instance, if this problem contains a trigonometry calculation, do I care if the student calculated the angle correctly?
  - How many discrete performance levels can I use on this problem? For instance, will I give points in 1-point, 2-point, or ½-point increments?

Grading terms: rubric

- A rubric is a guide for graders that explicitly indicates the key criteria on which the work will be graded.
- Rubrics have a scoring system:
  - Positive scoring awards credit for work done correctly → the score starts at zero and increases
  - Negative scoring deducts credit for work done incorrectly → the score starts at full credit and decreases

- In technical courses, we often use analytical rubrics, which break a problem/solution down into important discrete parts with little overlap.

Grading terms: learning objective

- A learning objective (LO) is a brief statement about what students are expected to learn in a course. In engineering, these are often expressed as ‘what students can (or will be able) do’.
  - Ex. (fluid mechanics): At the conclusion of this course, students will be able to apply concepts of mass, momentum, and energy conservation to solve flow problems.

- LOs can exist at the course level, the ‘chapter’ level, and/or the problem level.

- LOs can be conceptual (“...able to apply concepts of…”) or procedural (“...use finite difference approaches to solve…).

Grading terms: alignment

- The best rubrics are expressed in terms course- and/or chapter-level LOs. Why? When ‘aligned’ rubrics are used routinely, they:
  - reinforce for students the things they need to be able to do (i.e., the LOs).
  - allow students to track their progress on each LO across the semester to identify their strengths and weaknesses.
  - allow the instructional team to track performance for individual students and the class as a whole on the things the instructor said were important (the LOs).
  - provide a common vocabulary to talk about the course, the content, and the graded assignments.
- ‘Aligned’ grading practices connect the LOs to the content, the assignment, and the grading using a rubric. They also use written comments on the student’s submission to convey further detail.

Grading terms: alignment

- The best rubrics are expressed in terms course- and/or chapter-level LOs. Why? When 'aligned' rubrics are used routinely, they:

These 'aligned' practices communicate to students: (i) what are the important components of this course (the LOs), and (ii) how are they performing on them?

Grading is therefore a conversation with the student about their performance on the things you tell them are important in the course.

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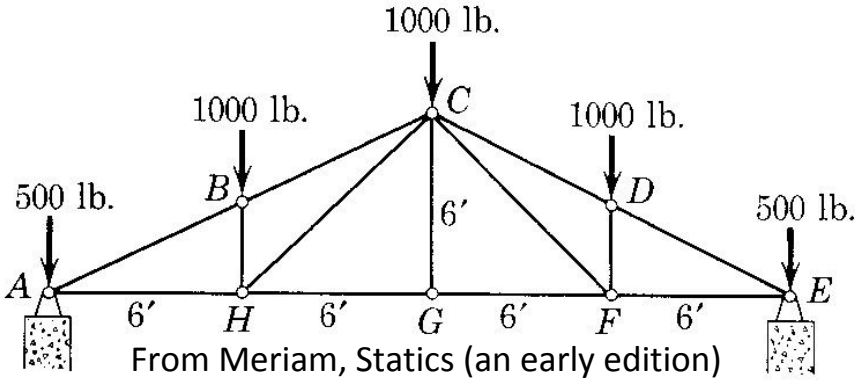
assignment, and the grading using a rubric. They also use written comments on the student's submission to convey further detail.

A negative scoring rubric based upon specific errors

Rubric item	associated points
1. Find reaction forces	**9 points**
A. draw FBD of structure	5
no coordinate system	-1
no labels on forces	-1
incorrect reactions	-2
forget external forces	-2
include internal forces	-2
B. write equil. equations	3
each missing equation	-1
incorrect signs	-1
C. solve for reactions	1
math error	-1
2. Find forces in members	**6 points**
A. draw appropriate FBD	2
incorrect labels/coord. system	-1
incorrect internal forces	-1
A. write equil. equations	3
each missing equation	-1
incorrect signs	-1
C. solve for reactions	1
math error	-1



From Meriam, Statics (an early edition)

N.E.: no evidence
U.A.: underachieved
P.A.: partially achieved
F.A.: fully achieved

Rubric examples: statics

A negative scoring rubric based upon specific errors

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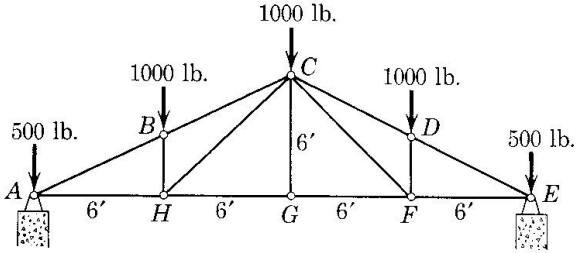


A positive scoring rubric based upon learning objectives

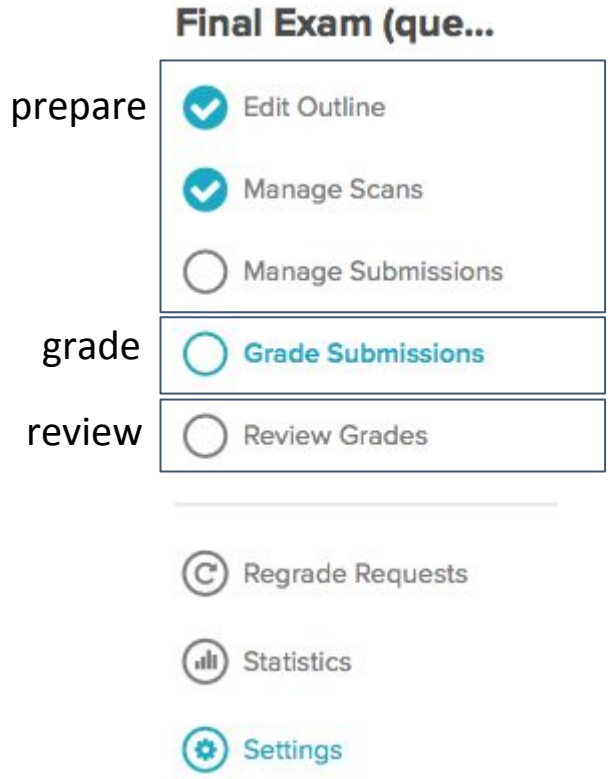
Rubric item (points)	Levels of achievement NE	UA	PA	FA
1. Draw FBDs (+7)	0	2	5	7
2. Write equil. equations (+6)	0	2	4	6
3. Complete numerical solution (+2)	0	1	-	2

Note:
N.E.: no evidence
U.A.: underachieved
P.A.: partially achieved
F.A.: fully achieved

Rubric examples: statics

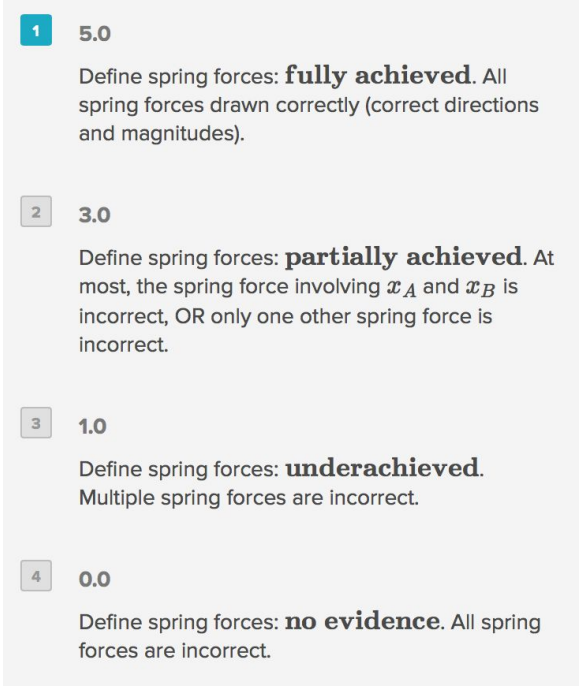
ME courses often use Gradescope

- For each assignment, you follow a grading workflow that includes 5 essential steps, plus a few extras.
  - “Outline” is the master template for the assignment.
  - “Scans” are the electronic files holding 1 or more student assignments.
  - “Submissions” are verified scans that correspond to an individual student, and have the required number of pages.



GS uses rubrics plus written feedback

- Rubrics express to students what you value in the problem, and ideally they are *tied to the learning objectives* of the course.
- Points are tied to *levels of achievement* for a rubric item.
- *Positive-scoring* rubrics are the most powerful implementation of this kind of thinking.
- *Written feedback* is including using a tablet input device.



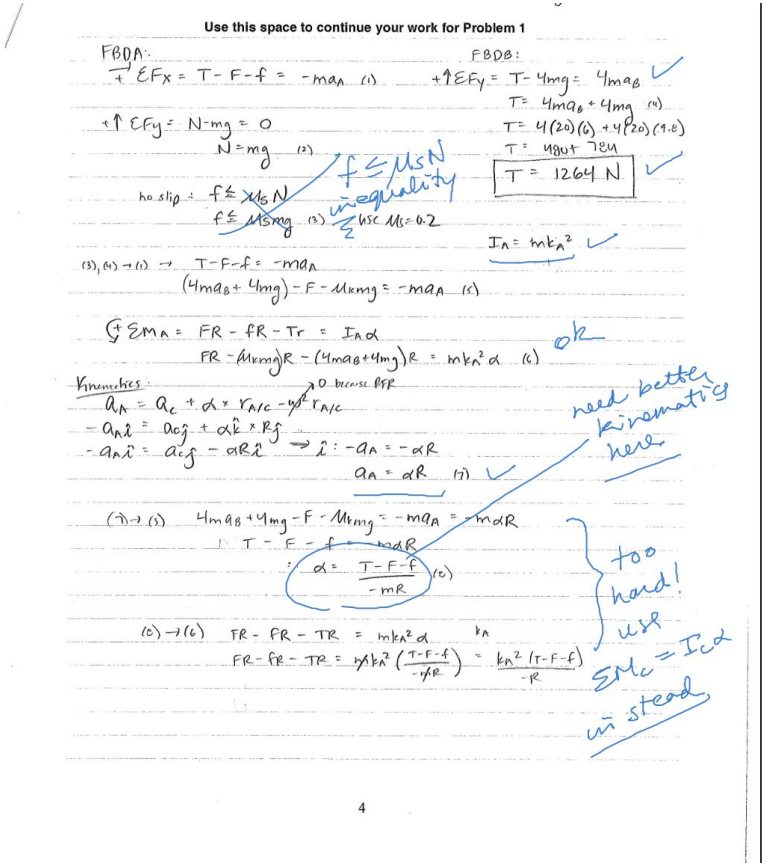
GS requires a disciplined workflow

- You definitely need a good, high-speed scanner. Scan errors kill efficiency. Some courses use Purdue centralized scanning facilities, especially for exams in large-enrollment courses.
- Protect your chain of assignment custody (the paper copies), especially if you outsource your scanning.
- Scan in small batches (~100 pages) using black & white (300 dpi maximum, perhaps less) rather than grayscale.
- Develop a process to organize your batches. If you discover a scan error later, you need to be able to quickly find the assignment and re-scan it.

GS's impact on the instructor

- GS makes you a better grader (assuming you write good rubrics).
  - You think very carefully about your rubrics and their connection to the course learning objectives.
  - GS enforces strong uniformity to grading practices, enabling distribution of grading across multiple people. (Caveat: there are still challenges here.)
  - GS makes grading efficient, transparent to students, and provides them two complementary kinds of feedback: rubric items and hand-written.
- GS makes assignment management faster and easier.
  - Students upload their own assignments (generally homework).
  - GS handles regrade requests using a well-defined process.

A graded example (ME 274 Dynamics)



Grading

4 **8.0**

Write Newton-Euler equations: **fully achieved**. Write at a minimum Euler equation for the drum ($\sum \vec{M}_C = I_C \vec{\alpha}$) and Newton equation for the mass $[\sum \vec{F}_y = (4m)a_{b,y}]$.

5 **6.0**

Write Newton-Euler equations: **partially achieved**. Meets fully achieved criteria with the exception of minor errors like sign errors.

6 **4.0**

Write Newton-Euler equations: **under achieved**. Missing several significant elements of the equations, or other omissions or incorrect terms. Examples: missing forces or chronic sign errors, or using $f = \mu_s N$ rather than the inequality $f \leq \mu_s N$.

7 **0.0**

Write Newton-Euler equations: **no evidence**. A large number of missing elements from the equations.

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Grading quality assurance (QA)

- There are many approaches to QA, some of which focus on students, while others focus on graders. All of them are substantially easier if you use Gradescope.
- Student QA questions:
  - Do the aggregate grading statistics agree with prior experience, intuition, and your actual experience of grading the assignment? The prior experience and intuition probably comes from instructors and senior TAs.
  - Does aggregate student performance across sections (for multi-section courses) seem reasonable? (This assumes the same assignment for each section.)
  - Do students with better prior performance (earlier in the semester) generally perform better on this assignment?

- There are lots of ways to set up automated procedures for these calculations using Excel, Matlab, R, etc.

Grading QA (continued)

- Grader QA questions:
  - Is the distribution of grades (numerical values) for each grader approximately the same (assuming they have graded a sufficiently large sample of student work)?
  - Does each grader apply the rubric items/achievement levels in approximately the same proportion, within and across sections?
  - Has each grader written a similar amount of feedback to students on their work? (This would be based upon a random sample of a grader's work.)
  - Does each grader report spending a similar amount of time grading? (This is self-reported by each grader, but wide disparities in time spent grading the same amount of student work should be explored more deeply for QA purposes.)

- There are lots of ways to set up automated procedures for these calculations using Excel, Matlab, R, etc.

Grading QA (continued)

- What if grading outcomes do not pass QA checks?

1. Review your own grading experience, and ask yourself questions like:
   a. Did I experience any ambiguity when applying the rubric?
   b. Do I think the point distribution across rubric items was appropriate?
   c. Did the rubric emphasize a concept or procedure that students were generally unprepared for?
2. Talk to your instructor(s) and/or senior TA(s). Share your reflection on question #1, and get their advice on further data analysis or other actions you should take.
3. Review grader calibration practices, especially for large assignments like exams in large-enrollment courses. If you feel like you need more guidance or training, you are responsible and accountable for seeking it out from your instructor(s) or senior TA(s).

Grading scenarios

1. You are one of the TAs for ME 270 (Statics). On homework #4, you notice (based upon information downloaded from Gradescope) that you applied a certain rubric item to student work about twice as often as your colleague who graded the same assignment for another section. What action(s) could you take?

- Talk to your colleague to determine whether you have a common understanding of that rubric item and its application.
- Confer with other TAs who graded that assignment to determine if they also hold a common understanding.
- Talk to your instructor about how to remedy the situation (regrade? do nothing?)
- The goal is to determine whether this is a ***genuine performance difference*** across sections, or if it is a ***grading difference***.

Grading scenarios

2. You are one of the TAs for ME 352 (Machine Design I). You have been provided with a rubric to grade an assignment, but you believe the rubric assigns too many points to a specific feature of the solution, and completely neglects another important feature. What action(s) could you take?

- Talk to other TAs to get their input on this question. Is there consensus among the TAs? Why or why not?
- Talk to your instructor about adjusting the rubric. If the rubric is updated, make sure to distribute it to all graders with a rationale for the change.
- The goal is to create and use a rubric that is ***fair***, that targets the important elements of the assignment (***the LOs***), and that can be ***applied uniformly*** across sections.

Grading: DISCLAIMER

- Grading can be done in many different ways, to achieve many different purposes. There is no one ‘right’ grading philosophy or process. Approaches to grading are highly contextual.

- Grading practices in ME courses are a function of history, instructor habit/preference, and the needs of the course.

- As such, your responsibility is to understand the expectations, philosophies, and specific practices of grading student work in your assigned course, as defined by the instructor(s) and/or senior TAs.

Academic integrity

- Promoting and maintaining academic integrity is among the most important things you will do in your role as instructional staff in ME.
- High standards for academic integrity are part of our values, and helping students uphold those standards is part of our mission.

An academic integrity violation has occurred when University or course policies have been violated around the use of collaboration, access to resources, or obtaining unauthorized aid in completion of an assignment.

“Unauthorized aid”

- What constitutes unauthorized aid?
  - Read the syllabus. It should have a clear statements about this, including consequences should the course or University policy be violated.
  - Talk to your colleagues on the instructional team. In addition to the syllabus statement, your instructors should convene a discussion among the team to ensure everyone has a common understanding of the policy and its enforcement.

Best practice: if you detect (or suspect) an academic integrity violation, follow the procedures outlined in the University or course policies on how to handle it.

Common violations

- Unauthorized collaboration:
  - Typically on quizzes or exams, involves sharing information by visual copying or text, Whatsapp, or similar electronic means
- Unauthorized access to resources:
  - Chegg.com or similar “tutoring” sites
  - General web resources for design assignments or lab work

- In an online setting, be especially aware; follow procedures defined by your instructional team (especially for Zoom-based exam proctoring).

See more examples.

Potential consequences

- ***These are EXAMPLES; refer to the syllabus and your instructional team to understand the specifics for your course.***

- Academic integrity violations can result in:
  - A score of 0 on the assignment
  - A grade of F in the course
  - Referral to the Purdue Office of Student Rights and Responsibilities (OSRR), which may recommend:
    - No further action
    - Remediation (taking an ethics class, for instance)
    - Suspension or dismissal from the University

Process is critical

- Throughout any academic integrity process, accused students have rights as outlined by the OSRR, which include:
  - The right to be informed in writing of all charges
  - The right to respond to charges.
  - The right to remain silent.
  - The right to an advisor.
  - Plus others…

- As such, if you suspect an academic integrity violation, you MUST follow the appropriate process in pursuing it. **DO NOT MAKE UP YOUR OWN PROCESS.**

Academic integrity scenarios

1. You are one of the TAs for ME 309 (Fluid Mechanics). On in-class quiz #2, you notice that several students submitted identical incorrect solutions. Your intuition is that this could not be a coincidence because the solutions are 'incorrect' in a very uncommon way. What action(s) can you take?

- Talk to your colleagues to get their opinion of the solutions. Do they agree that it seems unlikely to be a coincidence?
- Attempt to determine (by talking to the instructor?) whether these students usually sit together in class (and thus could have collaborated on the quiz).
- Review these students' prior work (homework) to determine if they usually/often submit identical work (indicating that perhaps they work in a study group and share the same understanding and/or misconceptions).
- The goal is to determine whether this is a ***an actual academic integrity violation***, or if it is an ***uncommon coincidence***.

Academic integrity scenarios

1. You are one of the TAs for ME 309 (Fluid Mechanics). On in-class quiz #2, you notice that several students submitted identical incorrect solutions. Your intuition is that this could not be a coincidence because the solutions are 'incorrect' in a very uncommon way. What action(s) can you take?

If you conclude that this is likely an academic integrity violation, discuss the issue in depth with your instructor, and be sure to follow the processes defined in University and course policies. DO NOT invent your own process!

- ms
- sit

together in class (and thus could have collaborated on the quiz).

- Review these students' prior work (homework) to determine if they usually/often submit identical work (indicating that perhaps they work in a study group and share the same understanding and/or misconceptions).
- The goal is to determine whether this is a ***an actual academic integrity violation***, or if it is an ***uncommon coincidence***.

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In summary

TAs play a critical role in our educational enterprise.

- You interact with students.
- You grade their work.
- You potentially go through the academic integrity violation process.
- You are a role model for academic excellence and high standards of conduct and behavior.

You are a very ‘public face’ of ME’s values, and your behavior conveys an important message to our students.

You have responsibility, authority, and accountability to convey positive messages to our students through your actions.

More resources for TAs

- Cornell engineering TA resources (especially the checklist)
- Carnegie Mellon resources (very thorough, filled with TA testimonials)