

Projects in Fluids Courses Made Easy (for You)

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Outline

- Assessment, grading
 - Rubric
 - Peer evaluation
 - Plagiarism
 - Turnitin.com
- Student Pushback
 - Teams
 - Slackers
 - Scheduling
 - CATME
 - Fear of open-ended assignments
 - Scaffolding

The Rubric

3021 Fluids Project Grading Rubric													
Members of Team _____		Project Title _____											
Date _____	Grader _____		Scale										
Performance Criteria	Minimal Effort				Meets Expectations				Exemplary; Exceeds Expectations				Score
Score	1	2	3	4	5	6	7	8	9	10	11	12	Score
Context, Introduction, Specifications/ Limitations	Does not include the full context or fails to specify the problem to be addressed, question to be answered, or design to be attempted.				Includes the full context.				Researches the context, and contributes additional information.				x1.5
	Neglects some of the physics/ limitations of the basic approach				Discusses the constraints of the approach.				Discusses the constraints of the approach, including important considerations not provided in the assignment. Brings in additional specifications and engineering considerations inspired by the context.				
Score	Does not describe the approach taken. Does not provide a summary of work to be described in the paper. Does not provide references for the physics used.				Describes the approach taken. Provides a summary of work completed. The basic physics are referenced.				Describes the approach taken, and includes the reasoning behind that choice of approach. Includes appropriate references for the physics and places the work in a broad context.				x2.5
	Schematics are missing critical aspects.				Schematics are complete with all aspects specified				Schematics are complete with all aspects specified. All plots are professional in quality, and well-annotated.				
Analysis Set-Up	Variables shown on schematics do not match those in the body of the report. Variables are missing from either the body or the figures.				Variables are mostly complete, and mostly match between representations.				Variables are complete, and match between all representations (report body, schematics, plots).				x2.5
	score				score				score				
Analysis Solution	Fluid mechanics principles (Continuity, NVS, Energy equation, Conservation of Mass and Momentum, fluids properties and process representation) are incorrectly applied.				Fluid mechanics principles are correctly applied, with basic documentation.				Fluids principles are correctly applied, with documentation worthy of publication.				x2.5
	Solution has algebraic or other errors.				Solution has no obvious errors but is minimally documented. Requires work to figure out what was done.				Solution has no errors, and is documented such that it can be quickly read and checked.				
score	Solution and/or report is hand-written.				Solution is mostly typed, but may have hand-written portions that are easy to read.				Solution is fully formatted, and all equations are typeset.				x2
	Solution is given, but no conclusions are drawn.				Solution is given and conclusions are drawn.				Solution is given and conclusions are drawn and supported.				
Summary Analysis	Solution is given, but conclusions are not supported by the evidence.				A reality check is given that adds credibility to the solution.				A reality check is given that adds credibility to the solution.				x2
	Solution is given, but a reality check (validation and verification) is not given, or solution fails a reality check.				Future work is proposed, extending the analysis or outlining the next steps for the chosen design.				Future work is proposed, extending the analysis or outlining the next steps for the chosen design.				
Score	score				score				score				x1.5
	Authors pursued a disappointingly simple project.				Authors pursued a slightly ambitious project.				Authors pursued an extremely ambitious project and delivered a superior analysis.				
Ambition	Project requires only simple algebraic analysis for one case. Simplifying assumptions are made to the extent that little analysis was required.				Project requires analysis of moderate difficulty				Analysis beyond the published literature was performed. The work is worthy of publication as original research.				x1.5
	Overall Comments												
												Total Score	

Sections

Descriptive criteria

Weighting * Totals

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Date _____		Grader _____				Project Title _____						
Performance Criteria	Minimal Effort				Meets Expectations						Exemplary; Exc	
Score	1	2	3	4	5	6	7	8	9	10	11	
	Does not include the full context or fails to specify the problem to be addressed, question to be answered, or design to be attempted.				Includes the full context.						Researches the context, and information.	
Context, Introduction, Specifications/ Limitations	Neglects some of the physics/ limitations of the basic approach				Discusses the constraints of the approach.						Discusses the constraints of important considerations n Brings in additional specific considerations inspired by	
	Does not describe the approach taken. Does not provide a summary of work to be described in the paper. Does not provide references for the physics used.				Describes the approach taken. Provides a summary of work completed. The basic physics are referenced.						Describes the approach taken reasoning behind that choice appropriate references for the work in a broad context.	
Score	1	2	3	4	5	6	7	8	9	10	11	
	Schematics are missing critical aspects.				Schematics are complete with all aspects specified						Schematics are complete with plots are professional in qu	
Analysis Set-Up	Variables shown on schematics do not match those in the body of the report. Variables are missing from either the body or the figures.				Variables are mostly complete, and mostly match between representations.						Variables are complete, and representations (report bo	
score	1	2	3	4	5	6	7	8	9	10	11	
	Fluid mechanics principles (Continuity, NVS, Energy equation, Conservation of Mass and Momentum, fluids properties and process representation) are incorrectly applied.				Fluid mechanics principles are correctly applied, with basic documentation.						Fluids principles are correct documentation worthy of p	
Analysis Solution	Solution has algebraic or other errors.				Solution has no obvious errors, but is minimally documented. Requires work to figure out what was done.						Solution has no errors, and can be quickly read and che	

The Rubric

- Provides clear expectations.
- Gives explicit credit for ambition.
- ‘Full credit’, 10 points, for ‘Meets Expectations’ satisfies students’ expectations for fairness. ‘Exceeds Expectations’ gets up to 12 points.
- Provides outline and organization of the report, what goes in which section.
- Weighting communicates your values; what is important.
- Makes assessment quicker and more objective.

Peer Evaluation

- Dramatically reduces your instructional load
- Peer eval using rubric can be programmed into LMS: Canvas, D2L etc.
 - Can control anonymous/not, random or manual assignments, number of evals
- You or TA can scan completed rubrics for outliers.
- Don't expect students to be strict or accurate graders, but they do accurately call out major strengths and weaknesses.
- Students benefit from the process:
 - Evaluating others' work reveals truths about your own work; inspires metacognition.
 - Critique is a valuable skill that everybody needs. Contributes to professionalism.
 - Criticism = What was wrong. Triggers defensiveness.
 - Critique = summary of strengths as well as what can be improved
 - Takes practice
- It's worth a little class time to discuss critique

Plagiarism

- There's an app for that: Turnitin.com
 - Schools subscribe.
 - Available through LMS or standalone.
 - Checks submitted work for overlap with
 - all previously submitted work, so you can repeat assignments without fear of recycled work
 - And the whole internet
 - Highlights text with overlap, cites source
 - Excludes explicitly quoted/cited text.
 - I allow students to see the results and resubmit.

Teams

- I use teams of 2. Cuts down grading by 2. Small team reduces problems with slackers.
- Students prefer to self-select partners, but this can isolate non-majority students. I allow self-selection up to a deadline, then I offer a matching service for everybody else:
- CATME.org.
 - Developed by Matt Ohland et al. using evidence-based methods.
 - Students input their **schedules** and whatever other info you want to use for criteria.
 - Algorithm optimizes teams based on your weighting factors.
 - Shows students contact info for their teams and schedule showing common times.
 - Used to be free (NSF developed) but now charges schools.
 - Provides tools for students to anonymously rate their teammates' performances.
- Team Behavior Coaching: *This American Life*. Podcast by Ira Glass. Episode 370 "Ruining it for the Rest of Us; One Bad Apple". First 12 minutes.
<https://www.thisamericanlife.org/370/ruining-it-for-the-rest-of-us>

Scaffolding

- Students may not know how to approach open-ended problems
- They fear an unknown time commitment, with unknown criteria (Rubric!)
- Scaffolding is a gradual introduction to the process.
 - Use a small-scale, low stakes, warm-up project
 - Provide numerous well-defined milestones/deadlines for a larger project
 - Choose a partner
 - Choose a topic from a provided list (or not)
 - Submit a list of sources (checked for archival and college level literature)
 - Submit an outline of analysis
 - Submit the first section/ introduction
 - Etc
 - Give credit for reviews and revisions

Tools Summary

- Rubric
- Plagiarism checker
 - Turnitin.com
- Team formation
 - CATME.org
 - This American Life: Bad Apple Behavior
- Constructive critique
- Grade generously; process gives self-efficacy, identity, affect. More important than negative feedback, which is counterproductive.
- Project assignment, rubric and these slides available at jeanbizhertzberg.com

Critique Guidelines

- Not the same as criticism.
 - Critique = evaluate thoroughly.
 - Criticize = find fault with.
- In our culture, we identify with our work. Attacks on our work = attacks on us. True for students and teachers.
 - Criticism triggers defensive response
- Critique identifies strengths as well as areas for improvement.
- Only talk about the work, never the person
- Articulating strengths in others' work is a valued skill.
- BE SPECIFIC. 'Good job' by itself is not very helpful.
- Question the questionable. Don't point out errors, just ask why.
- Do ask the hard questions.
- Takes practice. Critique is harder to do than criticism.

Critique Technique for Presentations

- Liz Lerman. “Critical Response Process | A Method for Giving and Getting Feedback.” <https://lizlerman.com/critical-response-process/>.
1. Statements of Meaning (or of strengths)
 2. Neutral Questions. No implied opinions.
 - Not ‘why did you leave out xyz’ but ‘does xyz play a role?’
 - Difficult. Takes practice.
 3. Author asks questions. “What did you think of ...(specific aspect)”
 4. Permissioned opinions. “I have an opinion about the approach. Do you want to hear it?”
 - Author can answer yes or no.