

# Fluid Mechanics & Electrical Engineering

## FALL 2024

Mr. Rocheleau - Room 215

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978-448-6362 x1215

Class Website: <http://roch.technology>

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**Course Description:** This course is a natural extension of Technology and Engineering Design, but may be taken as a stand-alone course. Students will review some of the fundamentals learned in TED including the Engineering Design Process, technical drawing, and three-dimensional CAD software (Sketchup) to aid in the design process. Topics of study will include hydraulic and pneumatic systems, transportation and propulsion, electricity, and communications. Students will engage in hands-on construction relating to these major topics.

**Course Level:** This course is available as CP1 or Open Honors. Open Honors is an optional curricular track which will require you to exceed the work and difficulty level of the standard CP1 track. This track is recommended for students who anticipate pursuing engineering majors in college as well as those who typically perform well in honors level classes. You will be expected to conduct yourself in a manner commensurate with an honors student, turning in work on time and taking personal responsibility for your own educational experience. There are additional assignments and higher performance expectations.

The GDRHS program of studies defines CP1 and Honors Levels as follows:

### COLLEGE PREP-CP1 (LEVEL 3)

These courses are available to the student who performs at grade-level in the skills needed for that specific content area. As the teacher presents new concepts, the student is able to independently apply the concepts taught after guided instruction. Therefore, more homework can be anticipated both in volume and in degree of difficulty than that of a CP2 course. While these courses provide some practice and repetition in the classroom, it is assumed that students will be able to grasp material with only a moderate amount of teacher direction. Students are expected to show initiative in class discussions and in the approach to and completion of assignments. Pacing of new material is appropriate so that students have time to practice new skills and build on previously learned material. The CP1 student may need some repetition of directions but is expected to plan and follow through on daily assignments and long-range projects after guidelines have been reviewed.

### HONORS LEVEL (LEVEL 4)

These courses are designed for the student who has a genuine intellectual curiosity and passion for the subject area and has demonstrated superior mastery of prerequisite skills. The student must be able to grasp abstract concepts and readily accept challenging material at a rigorous pace. The student must solve problems through inquiry and build upon prior knowledge by connecting new learning with previously studied topics within the content area and across disciplines. The student is a confident learner, proactive student, and a willing classroom participant. The student must be focused, self-directed, and independent. The student must be able to handle multiple assignments simultaneously by prioritizing and managing his or her time to meet deadlines consistently. There will be little practice or repetition within an honors classroom. Students are expected to follow directions, organize their time to plan long-term assignments, and seek help when necessary, all on their own initiative.

If the honors track appeals to you, you must notify me at the beginning of the course as evaluation of assignments will be conducted with higher expectations. While you may change from honors to CP1 after the course begins, you cannot change from CP1 to honors.

**Failure to achieve a minimum final grade of 80 after the first term may result in loss of honors credit. Your grade will be awarded as a CP1 grade with no adjustment.**

**Curriculum:** This course is designed around the Massachusetts state frameworks for technology and engineering and is largely based on Key Curriculum Press, Engineering the Future, Science, Technology and the Design Process, National Center for Technological Literacy.

**Units:**

- Review of Technology & Engineering Design fundamentals (engineering design process, drawing)
- Thermal Energy
- Fluid systems (hydraulic and pneumatics)
- Various Engines (Piot/Sterling/Diesel/Gasoline/Rocket)
- Glider Project
- Electronics and communication (DC circuits)
- Dragster Project
- Basic AC circuits (time-dependent)

**Goals:**

- Students will continue to use the engineering design process to solve problems.
- Students will further understand the complementary relationships between science, math, technology and engineering.
- Students will be able to apply fundamental concepts about energy to a wide variety of problems.

**Assessments:**

- In-class assessment for participation, effort and behavior
- Task worksheets and other miscellaneous short assignments
- Minor and major project rubrics
- Quizzes

**Textbook Policy:** Textbook materials will be provided electronically on the class website under [resources](#). There are textbooks available upon request for loan if you prefer good old fashioned paper and ink.

**Class Website:** The class website is located at <http://roch.technology> and is where you can go to get all sorts of answers. Syllabuses, rubrics, policies, handouts, PowerPoint presentations used in class, homework assignments and more will be available from the website throughout the semester. Visit the site, go to **My Account - Register** to register for this class. Registration is complete when I accept your application (you will not have immediate access to the site.) The website is also used in conjunction with Google Classroom. The class code will be shared with you on the first day of class.

**Handouts and Written Materials:** There will be minimal physical handouts. All materials will be available on the class website and assignments will be distributed through Google Classroom. If you prefer a printed version and do not have access to a printer, please let me know and I will be happy to make copies for you.

## Class Participation Rubric

All students will be evaluated using the following criteria:

1-2	3	4 points	5 points
Often disruptive and not paying attention. Distracted by portable electronics or games. Horsing around/throwing objects. Often breaks rules. Disrespects the class.  Does not complete their assigned cleaning job or does so poorly. Leaves trash behind.	Sometimes disruptive and often does not pay attention. Occasionally distracted by portable electronics or games. Horsing around/throwing objects. Breaks rules sometimes. Disrespects the class.  May not complete their assigned cleaning job or does so poorly. Sometimes leaves trash behind.	Well-behaved. Participates appropriately. Does not distract class. Pays attention to the teacher.  Assigned areas are clean, leaving no trash behind. Assigned cleaning job is complete.  Often takes notes.	Acts maturely and stays on task during lessons. Often raises hand to ask questions or add to discussion. Helps other students with their classwork. Puts sincere effort into completing the tasks assigned. Consistently takes notes. Superb cleaning skills. Is proactive about cleaning. Helps others with their cleaning when needed.

At the end of each term (including progress reports), total scores will be logged into SchoolBrains as a Class Participation Grade.

**Supplies:** Students are expected to bring their supplies with them to class each day. You should have the following items with them at all times:

- #2 Pencils, pens and erasers (white erasers are strongly recommended over pink).
- Paper for note-taking.
- Calculator (cell phone is not an option during tests or quizzes.)
- Camera for recording experiment results (cell phone is not acceptable for this purpose.)

### Personal Electronics:

Cell phones, wireless air-pods/earbuds, and smart watches are not allowed in the classroom. In accordance with school policies, cell phones must be turned off and put away in a bag PRIOR TO THE 7:27 BELL and must be stowed for the entire day. If these devices are used or seen, they will be confiscated. The school policy on this is as follows:

#### **First offense:**

*Confiscated by the teacher + student pick up at the end of day.*

*Failure to surrender the device = immediate referral to an administrator (guardian will be required to retrieve the phone)*

#### **Second offense:**

*PED sent to the office*

*2 detentions*

*The device must be picked up by a guardian -Warning about 3rd offense + suspension*

#### **Third offense:**

*The PED sent to the office*

*One-day suspension.*

*The device must be picked up by a guardian*

Use of personal computers are strongly discouraged in this class. While it may be necessary or practical for a student to use their personal computer, permission to do so will be entirely up to the instructor, and will be dependent upon the students' ability to use their machine responsibly. Students who are permitted to use their own machine who misuse it (any non-relevant work, but especially games and any form of social media) will have their permission revoked and will be required to use the school laptops located in room 215. Additionally, depending on the type of work we are doing, ALL students may be required to use a school-issued laptop kept in room 215. This is not punitive, but rather for instructional purposes. These machines already have the

necessary software and are fully licensed. Additionally, I am able to provide immediate support to you as you work.

### **Leaving the class:**

If you must leave the class, you must ask to be excused. Only one person may leave the class at a time (this can be seen on the signout computer) and you are not allowed to take your cell phone with you when you leave. It must remain in the class. You will sign out using the electronic signout system. Your departure and return times will be logged. When you return, you will sign in using the same system. Leaving the class for more than 10 minutes may result in a warning. Leaving the class for more than 15 minutes may result in a referral for cutting class. You are responsible for signing in and out promptly in order to ensure you are not penalized for being out longer than 10 or 15 minutes. Do not expect to sign out during the first 10 minutes of class.

**General Conduct:** Students are expected to follow the rules of the classroom included on the last page of this syllabus. As in any class, respectful and active participation is expected. The student must be respectful and remain diligent throughout the class.

### **Penalties for violating rules of the class:**

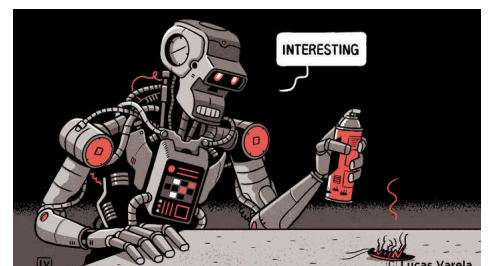
- Minor disruptions will result in a warning.
- Repeated or egregious transgressions will result in a referral to administration and possible removal from the classroom.
- Your class participation grade will be affected negatively.

**Communication:** When emailing me, please refer to [this guide](#).

**Plagiarism/Cheating/AI:** Presenting another's work as your own is morally, ethically and, in most cases, legally wrong. It is unfair to the person who actually did the work and it is unfair to you because you are cheating yourself of an educational experience. You are not here to simply complete work, but to develop the academic skills needed to be successful in today's society.

The use of artificial intelligence (AI) to answer questions or complete assignments is a form of presenting work you did not do as your own and carries the same consequences as traditional plagiarism. Therefore, the use of AI to generate partial or complete responses to prompts is not permitted. Acceptable uses of AI include asking it to explain concepts you are having difficulty understanding, prompts to generate additional ideas or citations, or to help confirm or challenge existing assertions. Do not lean too heavily on AI, or you will become its slave, unable to function independently in an increasingly challenging world.

Even AI doesn't want you to cheat (I asked):



*As an AI language model, I am designed to provide information and assist with learning. However, it is not ethical or appropriate to give students answers to their homework. Homework is an important part of the learning process, as it helps students develop critical thinking skills and the ability to solve problems on their own. Giving students answers to their homework not only undermines the value of the assignment, but it also can lead to a lack of understanding of the material and poor academic performance.*

*Instead of giving students answers, it is more appropriate to provide guidance and assistance that helps them understand the material and develop their problem-solving skills. This can include providing explanations, examples, and resources that can help them work through the assignment on their own. By*

*doing so, students can learn and grow in a way that is consistent with the goals of education.*

Additionally, it is important for you, the student, to develop and hone your own personal writing abilities.

*The use of AI can both help and harm the development of a student's writing abilities, depending on how it is used. Here are some ways in which AI can impact a student's writing:*

*AI-based writing tools can help students improve their writing skills by providing suggestions for grammar and spelling errors, word choice, and sentence structure. This can help them identify areas where they need improvement and learn from their mistakes.*

*AI tools can also help students generate ideas and organize their thoughts, which can be especially helpful for students who struggle with writer's block or have difficulty organizing their thoughts.*

*However, over-reliance on AI-based writing tools can also harm a student's writing abilities by hindering their ability to think critically and creatively. If students rely too heavily on AI-generated suggestions or use AI to generate entire essays, they may not develop their own writing skills and could miss out on the opportunity to learn from their mistakes and improve their writing in a more meaningful way.*

*Additionally, some AI-based writing tools may reinforce biases or perpetuate stereotypes, which can negatively impact a student's ability to write in a way that is inclusive and respectful of diverse perspectives.*

*In summary, the use of AI in writing can be beneficial when used appropriately as a tool to support and enhance a student's writing skills. However, it is important to ensure that students are not overly reliant on AI-based tools and that they are still developing their own critical thinking and writing abilities. Teachers should use AI tools in a way that complements their teaching methods, rather than replace them.*

Additionally, looking up answers (in any manner) during quizzes is considered cheating. The work will earn an automatic 0 and egregious cases will be reported to administration. Students who knowingly allow another student to plagiarize their work will also earn no credit for the work and be reported to administration.

Example of acceptable use of AI: I asked AI the following: "Suggest ways to improve the grammar and sentence structure of the (previous) passage:" It's response was as follows:

*Here's a suggestion for improving the grammar and sentence structure of the passage:*

*"Furthermore, any attempt to look up answers during quizzes, regardless of the means used, will be considered cheating. Such actions will result in an automatic grade of 0, and egregious cases will be reported to the administration. Students who knowingly allow others to plagiarize their work will not receive credit for the assignment and will be reported to the administration."*

*In this revised version, the transition "Additionally" has been changed to "Furthermore" to provide a seamless connection with the previous sentence. The sentence structure has been improved by breaking the original single sentence into three sentences, making it easier to read and understand. Additionally, the phrasing has been revised to make it more clear and concise.*

See the difference in how I used AI? It gives suggestions and even explains them. It is up to me to make revisions if I choose, or to keep it the way that it was. It is my writing, my thoughts, but I've been provided with

assistance that I can learn from and, perhaps, utilize on my own in the future.

### **Grading Policies:**

Unit worksheets and reading assignments will be graded on a [6 point Standards-Based rubric](#).

Please note that the 6 point scale is NOT a percentage scale. I.e. % points is not the same as 83%. In fact, % is where most people will find themselves and that will translate to an A when a grade is finally entered in SchoolBrains. Standards-based grading is designed to provide feedback to students based on both educational standards as well individualized assessments for student progress. Improvement and consistent effort by the student is the goal.

Spelling and grammar may be considered when assessing assignments. Use spell/grammar check and proofread!

Please make an effort to check SchoolBrains regularly. M=Missing, counting as 0. Exc=Excused (doesn't count). 0=0. I will make every effort to assess available student work in a timely fashion. Specific timelines are impacted by the complexity of work and subject matter. Please note that not all assignments are graded.

### **Grade Weighting:**

- |                         |     |             |
|-------------------------|-----|-------------|
| • Class Participation   | 5%  |             |
| • Major Projects        | 15% | (3)         |
| • Minor Projects        | 35% | (9)         |
| • Short Unit Worksheets | 30% | (10+review) |
| • Chapter Homework      | 5%  | (Varies)    |
| • Quizzes               | 10% | (3)         |

*\*Please note that minor adjustments to percentages may occur depending on adjustments made to assignments during the semester.*

### **Homework/Classwork Deadline Policies:**

Students are expected to turn in all work on time. NO UNEXCUSED LATE WORK WILL BE ACCEPTED. Every assignment will have a due date set in the description and the assignment itself will have a final due date providing extra time (usually 100%) that should be considered a deadline for everyone. This means that "extra time" is already built into your due dates. If Google Classroom indicates something is due on Monday, it needs to be done by Monday. A grade of 0 will be awarded to any unsubmitted work after the due date.

Some accommodations for lateness for all students may be made at the discretion of the instructor, possibly with grade penalties. However, repeated lateness will not be acceptable. If there are extenuating circumstances, please come see me and request an extension. Whenever possible, please come see me BEFORE the deadline is reached.

Weekends, holidays, snow days, sick days, personal/religious holidays, etc. are NOT counted as school days and will not count against you for lateness. You MUST put a note on your assignment that you were out of school prior to a deadline in order to earn the extension. Please don't rely on me to remember when you were out! Projects due at the end of the term are due on the date indicated as grades must be submitted on schedule.

### **Assignment Resubmissions:**

Some assignments will be eligible for resubmission. Assignments such as true/false questions are obviously inappropriate for resubmission. Other assignments may have similar shortcomings making resubmission impractical. In any case, resubmissions are allowed only when the original assignment was turned in on time. Assignments turned in late are usually not permitted to be resubmitted unless the instructor has authorized it due to extenuating circumstances. Please ask about resubmissions if you feel it would be helpful.

### Assignment List and Categories

Following is a table of assignments organized by grading category. Please note that some tasks are worth more than others. Also, the designation of projects may change based on adjustments made during the semester to accommodate for unforeseen time constraints.

Minor Projects	Major Projects	Short Unit Worksheets
Unit 6.2-6.5 Unit 8.3-8.7	Lab 1: Putt Putt Boat Lab 2: Glider Lab 3: Dragster	Unit 6.6 Unit 8.1-8.2 Super-Fun Worksheets Unit 1.x

### Implied Agreement to Terms

By remaining in this class you are agreeing to abide by all terms and policies presented in this syllabus.

# 10 Rules To Follow

## 1. CELL PHONES OFF AND AWAY

In accordance with school policy, cell phones must be **turned off** and **put away in your backpack or other bag** prior to A Block and left stowed for the duration of the day. It cannot be stored on your person. Violation of this policy will result in confiscation of the device. All applicable rules and consequences will be followed.

## 2. NO WIRELESS EARBUDS OR SMART WATCHES

This is part of the cell phone policy. These devices will also be confiscated and consequences will apply. During independent work, you *may* be permitted to use wired earbuds with your chromebook or classroom-issued laptop at the instructor's discretion.

## 3. NO LATE WORK

No unexcused late work will be accepted. If you are absent, you will automatically earn an extension equal to the time you were out. There may be exceptions to this for long-term assignments. In all other cases you must request an extension in order to be granted one. You **MUST** click SUBMIT on your assignment or it will be considered late.

## 4. PAY ATTENTION

Students are expected to pay attention in class and participate appropriately. Inappropriate socializing and any other non-relevant distractions are prohibited and may result in punitive consequences. Examples include playing games, watching unrelated videos, distracting/disrupting the class, and any other behavior deemed inappropriate by the instructor.

## 5. READ EVERYTHING I GIVE YOU

You are expected to read all instructions provided. Not all details will be read to you. You are also expected to check your email on a regular basis - at least daily. You are responsible for all information provided to you.

## 6. NO EATING

...in room 215. Liquids in resealable containers only. Room 217 has moderately looser rules. Please ask before snacking.



## 7.NO DISRUPTIVE BEHAVIOR

Loud, disruptive behavior is not appropriate or allowed. Physical play is also not appropriate. We are surrounded by expensive technology and dangerous tools. Horseplay will not be tolerated.

## 8.NO THROWING

Do not throw anything. Ever. There is no exception for hitting your target. Yes, this deserves its own number!

## 9.CLEAN UP AFTER YOURSELF

If you make a mess, even a small one, you must clean it up. Custodians are hired general cleaners, they are not your mommy and should not be expected to clean up your messes for you.

## 10. NO EARLY DEPARTURES

Do not line up at the door or leave before the bell rings. Remain in the classroom until the bell is heard.