

**ME 2D03 Fall 2024 – Course Outline**  
**Mechanical Engineering Design Elements**

**Instructor:** Daniel Pinelli, M.Eng, P.Eng, [pinelld@mcmaster.ca](mailto:pinelld@mcmaster.ca)  
Office Hours: Thursdays 3 – 4 pm

**Teaching Assistants:** Eddy Wu, [wuy187@mcmaster.ca](mailto:wuy187@mcmaster.ca)  
Yu Zhang, [zhang21@mcmaster.ca](mailto:zhang21@mcmaster.ca)  
Manar Emira [emiram@mcmaster.ca](mailto:emiram@mcmaster.ca)  
Nikoo Manouchehri Naeini [manoucn@mcmaster.ca](mailto:manoucn@mcmaster.ca)  
Mohab Ihab Mefreh [mefrehm@mcmaster.ca](mailto:mefrehm@mcmaster.ca)

**Lectures:** Monday, Wednesday & Thursday 4:30 pm – 5:20 pm

**Tutorials:** T01 Tuesday 2:30 pm – 3:20 pm  
T02 Thursday 2:30 pm – 3:20 pm  
T03 Wednesday 12:30 pm – 1:20 pm

**Exams:** Midterm: Friday, October 25, 7 – 9 pm  
Final Exam: Date & Time TBD by Registrar's Office

**Course Description:** Design synthesis, fundamental principles of standard design elements, mechanical and fluid power elements, component specification and optimization

**Course Topics:**

1. Design – Design Principles, Material Selection, Simple Machines
2. Shafts – Shaft Elements, Tolerances, Fits
3. Gears – Gear Types, Gear Trains, Gear Strength
4. Transmissions – Torque & Power, Transmissions, Planetary Gears
5. Drives – Belts & Chains, Brakes & Clutches, Fluid Power
6. Cams – Cam Principles, Displacement Functions, Cam Design
7. Mechanisms – Kinematic Diagrams, DOF & Mobility, 4 Bar Linkages
8. Connections – Welding, Fasteners, Bolt Strength
9. Bearings – Bearing Types, Bearing Life
10. Machine Design – Examples, Applications

**Course Materials:** All relevant and required course materials will be posted on Avenue  
Drawing Instruments – Set containing ruler, compass & protractor is required  
Calculator – McMaster standard calculator is required (Casio FX-991MS)  
Textbook – None (Shigley's Mechanical Engineering Design is optional)

**Evaluation:** 20% Assignments (4 worth 5% each)  
20% Tutorial Activities (10 worth 2% each)  
30% Midterm Exam  
30% Final Exam

### **Communication Methods**

Please use email or in person discussion to get in touch with me. I am available for in person discussion after the lecture times stated above and during my scheduled office hours. I monitor email frequently and endeavour to provide prompt and meaningful responses. During the week, I check my email in the early morning and then again towards the end of the work day (~5 pm). During the weekend, I often check email but with less consistency. Please allow at least 48 hours for a response before following up.

While Microsoft Teams is an excellent collaboration tool, sending a message while I am not online is not an effective way to get your question answered as I do not get notified of these messages until the next time I open Teams. For this reason, please use email or in person discussion for questions.

### **Communication Conduct**

All communications throughout the course are expected to be made with integrity and purpose. Be polite and professional in your communications and you are much more likely to get a response. Be clear and concise about the purpose and goal of your request and you will find you more often get what you are looking for. Use a descriptive subject line to help the recipient understand immediately what you are talking about. Do not attempt to get a question answered within a few hours of a due date. Be proactive and reach out with questions early to address issues before they become imminent problems.

### **Submissions**

Course submissions will be a combination of electronic file submission through Avenue and in person submission of written work. All assignments and tutorials will be submitted electronically to the relevant Avenue dropbox. The midterm and final exams will be submitted in person as written work.

For electronic submission, the Avenue dropbox is the only acceptable location for file submission. Do not email your work directly to the instructor or a TA (it will not be accepted or graded). The required format of most submissions will be PDF in a single file (multiple files not permitted). Certain assignments or tutorial activities may also require the submission of a different file format such as an excel spreadsheet. This will be clearly specified in the assignment or tutorial activity description.

A method for converting handwritten work to PDF will be required throughout the course. If available, a scanner can be used. Alternatively, mobile apps are available such as CamScanner and Microsoft Lens. Please ensure that you have the capability to reliably convert multiple images or sheets of handwritten work into a single PDF for submission.

### **MSAF**

In the event of an absence for medical or other reasons, students should review and follow the Academic Regulation in the Undergraduate Calendar "Requests for Relief for Missed Academic Term Work". An MSAF request must be submitted to the department and the instructor notified immediately. At this point, the instructor and student will engage in a dialogue about making up the missed work. In general, the

preference is to extend the due date for the missed work to a mutually agreed upon later deadline. Other options will be considered under special circumstances only. The MSAF cannot be used on the midterm or final exam. If the student is unable to write the midterm or final exam during the planned time, they must engage in a dialogue with the instructor as early as possible in the term about deferring the midterm or exam to a later date. Deferral will be considered under special circumstances only.

### **Lectures**

Lectures will be delivered in person at the times and location stated above. The lecture slides will be posted to Avenue in advance of the lecture times. The course is organized into 10 weeks of content, each containing 2 to 4 lectures pertaining to that week's topic. The lectures deliver the bulk of the course content and are important for developing an understanding the concepts discussed. At the end of certain classes, sample problems will be solved in class related to the lecture content. These sample problems and their solutions will be posted to Avenue as whiteboard notes at the end of each week.

### **Tutorials**

Tutorials will be delivered in person by TA's beginning the second week of term. There are 3 sections per week at the times and locations stated above, each delivering the same content. Each tutorial focusses on a subtopic or application of the lecture content from the previous week. The tutorials start with a short presentation or demonstration by the TA, followed by a tutorial activity with a deliverable for the students to submit. The deliverable is due the following week on the day of the last weekly tutorial for all sections. This allows a minimum of 1 week for all students regardless of section to complete and submit the tutorial activity. Please see the Course Schedule for a complete listing of all due dates. There are 10 tutorial activities in total worth 2% each of the final grade. Submission for all tutorial activities will be electronic through Avenue.

### **Assignments**

Assignments will be released through Avenue approximately every other week and due 2 weeks after their release, starting mid September and continuing throughout the term with the exclusion of Reading Week and the week preceding the midterm. Please see the Course Schedule for a detailed listing of all due dates. There are 4 assignments in total worth 5% each of the final grade. The assignments will be an evaluation of the student's understanding of the content learned in the weeks preceding its release. Submission for all assignments will be electronic through Avenue.

### **Midterm & Final**

The midterm and final exams will be completed and submitted in person. The date, time and location of the midterm and final exams are stated above. Only the McMaster standard calculator may be used during the exams as an authorized aid. The use of any other aid (including cell phones) is not permitted and in such case the student's exam will not be accepted or graded. The final exam must be written or else a final grade of 'F' will be awarded with the notation Did Not Write. The standard numeric to letter grade conversion will be used to assign the appropriate letter grade at the end of the course.

## **McMaster Policies**

### Academic Integrity

You are expected to exhibit honesty and ethical behaviour in all aspects of the learning process. The academic credentials you earn are to be rooted in principles of honesty and academic integrity. Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, including a grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university. It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy at [www.mcmaster.ca/academicintegrity](http://www.mcmaster.ca/academicintegrity).

The following illustrates only three forms of academic dishonesty:

- Plagiarism (submission of work that is not your own or for which other credit has been obtained)
- Improper collaboration in group work
- Copying or using unauthorized aids in tests and examinations

### Academic Accommodations for Disability

Students requiring academic accommodation due to disabilities should contact Student Accessibility Services (SAS) to make arrangements with a Program Coordinator. Student Accessibility Services can be contacted by phone 905-525-9140 ext. 28652 or e-mail at [sas@mcmaster.ca](mailto:sas@mcmaster.ca). For further information, consult McMaster University's Academic Accommodation of Students with Disabilities policy.

### Academic Accommodation for Religious, Indigenous or Spiritual Observances (RISO)

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the RISO policy. Students requiring a RISO accommodation should submit their request to their Faculty Office normally within 10 working days of the beginning of term in which they anticipate a need for accommodation or to the Registrar's Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

### Extreme Circumstances

The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (severe weather, labour disruptions, etc). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, A2L and/or McMaster email.