## ME102: Foundations of Product Realization

Summer 2024, 3 units

### Teaching Team

Jonathan Edelman (Instructor)  
Rachel Leou (CA)  
Stephen Guerrero (CA)  
Henry Ojeaburu (CA)

[Emails and contact information provided for each team member]

### Class Locations and Times

- **Tuesday Room**: 550-200, 10:30 AM - 12:20 PM
- **Thursday Room**: 550-200, 10:30 AM - 12:20 PM
- **PRL, Building 610**: Open Shop Hours, Coaching

### Office Hours

- Dr. Edelman: Thur 1:00 PM - 2:00 PM, Peterson 102
- Rachel Leou: Open Shop Hours
- Stephen Guerrero: Open Shop Hours
- Henry Ojeaburu: Open Shop Hours

### Course Description

This course gives students the opportunity to practice individual elements of the design process. With the guidance of the teaching team, students build rapid and functional prototypes using hand tools and power tools in the Product Realization Lab (PRL). Throughout the quarter, students will practice and improve their skills in sketching, making, and computer aided design (CAD).
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Learning Objectives

This course is designed to provide students with:

1. Preparation for learning with and contributing to the PRL
   1. continuing in PRL courses
   2. independent/coursework/research in the Lab
2. Understanding and practice fundamentals of Product Realization
3. Thinking with head, hands, materials and tools
4. Communication (visual and verbal)
5. Iterative Prototyping
6. Sketching
7. Hand fabrication
8. CAD (Computer Aided Design)
9. Computer controlled fabrication
10. Frameworks for meaningful Critique
11. Working in Teams
12. Curiosity, questioning, personal interest

Prerequisites

ME102’s prerequisites are listed as E14. This is university mandated, no negotiations. (For summer visiting students, the prerequisites are not strictly required)

Keep in mind that the ME102 admissions process prioritizes students for whom ME102 is a requirement to graduate.
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Course Expenses

ME102 has a course fee of $60. [For summer session, there is no course fee]
This fee will cover materials used for project work. Materials are purchased in bulk in order to pass savings on to you. The course fee is charged to your University Bill and is eligible for financial aid. We do not expect you to have any additional out-of-pocket expenses.

Computer Policy

Computers will be used for digital design work in ME102. We will discuss available software options and how to access them on your computer or through the computers in the PRL or campus clusters. In lecture, computers are not allowed in order to encourage engagement. See “Electronics” section for more details.

Getting Help

When you find yourself in need of help, if the issue is:

- **Administrative**, please reach out to the teaching team on slack or email CC’ing all members
- **Personal**, please reach out to the course instructor
- **Content**,
  - Post your question to the Slack channel (remember the adage, “If you have a question, someone else probably does too”)
  - Attend CA office hours for in person help
  - Go to Building 610 or Room 36/AMPS during open hours to get help from PRL CA’s (all of which are familiar with class content and briefed on weekly homeworks and will be able to provide additional help or support)
  - For CAD specific questions you may also contact the Fusion ambassador
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If a question arises, first check to see whether the same or a similar question has been raised and answered previously in the general slack channel. We encourage you to post your question to the “#general” Slack channel as you are most likely not the only one with this question. If you have a question you would rather not post to the entire channel, and you also don’t want to DM it to the entire teaching team, it’s perfectly fine to DM just one member of the teaching team. However, messaging the entire teaching team will increase the likelihood of receiving a prompt response.

Grading

Total = 1000 pts

- Participation: 100 pts (10 %)
- Mid-Term: 150 pts (15%)
- Portfolio: 25 pts (2.5%)
- Object Gratifying to Handle: 100 pts (10%)
- Machines: 625 pts (62.5%)

Additional Factors

- Extra Credit (potential to bring total over 1000+): On a case by case basis, Assignments that go above and beyond the expectations. Examples will be given in class or as requested.
- **Attendance is mandatory and does not add points.** You can think of it as starting at 0, and subtracting from your total if you fail to adhere.
  - Unexcused Absences/Leaving Early = -10 pts; Tardiness = -5 pts
  - Please see the “Attendance” section below for more information.

At the end of the quarter, the 1000 point scale will be mapped onto the standard 100 point grading system that maps to letter grades as follows:

<table>
<thead>
<tr>
<th>A+</th>
<th>A</th>
<th>A-</th>
<th>B+</th>
<th>B</th>
<th>B-</th>
<th>C+</th>
<th>C</th>
<th>C-</th>
<th>D+</th>
<th>D</th>
<th>D-</th>
<th>NP</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;100%</td>
<td>≧ 95%</td>
<td>≧ 90%</td>
<td>≧ 87%</td>
<td>≧ 83%</td>
<td>≧ 80%</td>
<td>≧ 77%</td>
<td>≧ 73%</td>
<td>≧ 70%</td>
<td>≧ 67%</td>
<td>≧ 63%</td>
<td>≧ 60%</td>
<td>&lt; 60%</td>
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</tbody>
</table>
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NOTE: Some elements of the homework assignments will be graded for completion only (for example, proof of installation of software, workshops, etc.) Failure to complete these elements will result in a penalty assessed to the student’s final grade for the quarter of 1% per incomplete element. The rubric on every homework assignment will show these elements as “graded for completion only”.

Lecture and Workshop Attendance

Attendance and participation in lectures, structured labs, coaching, and workshops is required.

Attendance will be taken at the start of each class. If you must miss a class due to illness or extenuating circumstances, you must communicate with the CAs via email before the lecture or workshop. If you are granted an excused absence from lecture, you will need to speak with a ME 102 CA to get up to date. Missed Lecture Assignments will be due the day after lecture at 5pm and should be submitted to the CA’s via email. If you miss a workshop, we will arrange a make up workshop on a case-by-case basis.

Please be aware that course conflicts should be avoided and absences due to varsity athletic events are generally not excused, but will be considered on a case-by-case basis. Varsity athletes are recommended to not take this course while in season.

Unexcused Absences/Tardiness

Each unexcused absence from lectures, coaching, or structured labs will lower the student’s final grade for the quarter by 10 pts. Additionally, each tardy (late) arrival will lower the student’s final grade by 5 pts.
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If you arrive after 10:30 AM, you will be marked as tardy. If you arrive after 11:00 AM you will be marked as absent. Leaving early (without prior approval or speaking with the teaching team) will result in an absence.

Electronics

ME 102 is a device free environment.
That means students are not permitted to use computers, smart phones, tablets, ipads, iphones, iPods, MP3 Players, earbuds, headphones, VR rigs, etc. If you need to use a device for medical or health reasons, you must provide an OAE or letter from your doctor.

Weekly Homework

[TEMPLATE is on Canvas under Files]

If your submission is not titled correctly, you will receive no credit.

You will compile your homework into one pdf document to submit (google doc/slide links are not accepted). Make sure to correctly tag your pages on Canvas.

If your pages are not labeled in accordance with the requirements, you will receive no credit.

Here is how your pdf must be labeled:

last name, first name, assignment number, assignment name, date.pdf

Additionally, on the digital submission itself you must put this information at the top of the submission:

last name, first name
class name, session (eg, ‘summer 2024’)
assignment number, assignment name
date

If your submission is not titled correctly, you will receive no credit.
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Homework assignments are subject to the late work policy outlined below.
Some homework will feature a quiz.

Class submissions/physical instantiations of homework are to be brought into class as displayed for discussion.

Include a 3" x 5" plain white card with the following information clearly printed:
last name, first name
class name, session (eg, ‘summer 2024’)
assignment number, assignment name
date

If your physical work is not properly presented with a 3x5 card as above you will receive no credit.

Late Work Policy

Late work will be accepted up to five days after the due date.
After that, assignments and homework will not be accepted.
Additional late days will only be granted for students with accommodations or in extenuating circumstances.

Late assignments will be subject to a deduction of 10% per day or any portion of a day.
For example, if an assignment worth 100 points is due at 9:00 AM on Tuesday and is turned in after 9:00 AM Tuesday, there is a 10 point deduction. If it is turned in after 9:00 AM on Wednesday it will incur an additional 10 point deduction, which is a total of 20 points.

Homework Grading & Regrade Requests
Homework grades will be released on Canvas. Please submit any homework regrade requests via Canvas no later than one week after the grades for that homework have been published. No regrade requests will be accepted beyond this deadline.

Incomplete Policy

By University definition, an Incomplete can only be offered in cases where a substantial amount (approximately 80%) of coursework has been completed. If you have unfinished work at the end of the quarter, we will grade the partial work you can submit.

Students with Documented Disabilities

Students who may need academic accommodation based on the impact of a disability must initiate the request with the Office of Accessible Education (OAE). Professional staff will evaluate the request with required documentation, recommend reasonable accommodations, and prepare an Accommodation Letter for faculty dated in the current quarter in which the request is being made. Students should contact the OAE as soon as possible since timely notice is needed to coordinate accommodations. The OAE is located at 563 Salvatierra Walk (phone: 650-723-1066, URL: http://oae.stanford.edu).

Stanford University Honor Code and Fundamental Standard

The Honor Code is the university's statement on academic integrity written by students in 1921. It articulates University expectations of students and faculty in establishing and maintaining the highest standards in academic work.

1. The Honor Code is an undertaking of the students, individually and collectively:
   that they will not give or receive aid in examinations;
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1. that they will not give or receive unpermitted aid in class work, in the preparation of reports, or in any other work that is to be used by the instructor as the basis of grading;
2. that they will do their share and take an active part in seeing to it that others as well as themselves uphold the spirit and letter of the Honor Code.

2. The faculty on its part manifests its confidence in the honor of its students by refraining from proctoring examinations and from taking unusual and unreasonable precautions to prevent the forms of dishonesty mentioned above. The faculty will also avoid, as far as practicable, academic procedures that create temptations to violate the Honor Code.

3. While the faculty alone has the right and obligation to set academic requirements, the students and faculty will work together to establish optimal conditions for honorable academic work.


The Stanford University Fundamental Standard states that students at Stanford are expected to show both within and without the University such respect for order, morality, personal honor, and the rights of others as is demanded of good citizens. Failure to do this will be sufficient cause for removal from the University.

Working in the PRL Community

In the PRL community any behavior, verbal or physical, that is harmful to anyone’s identity will not be tolerated. Beyond eliminating disrespectful behavior, we are committed to creating a community that is inclusive and where supporting one another is a defining characteristic. We recognize the existence of systemic discrimination in the US and the lack of diversity in the field of engineering; we are committed to continued learning, discussion, and improvement to create an inclusive and diverse learning environment.
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Course Schedule

*Note: Class session 1.1 and 1.2 meet in the PRL Woodworking Lab, Building 610
Please wear long pants, closed toe leather shoes, and safety glasses if you have them.*

<table>
<thead>
<tr>
<th>Topic</th>
<th>Content</th>
<th>Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1.1 Lecture 6/25/24 Introduction to Foundations of Product Realization</td>
<td>Presentation and discussion about the course content, course learning goals, course expectations, tests, and grading. Safety Training Structured Lab: Tools of the PRL Woodworking Lab Structured Lab: Portfolio</td>
<td><strong>ASSIGNMENT 1: Portfolio</strong> Due 7/2/2024 Online Submission 9:00 AM &amp; Classroom Submission 10:30 AM</td>
</tr>
<tr>
<td>Week 1.2 Lecture 6/27/24 Object Gratifying to Handle (OGH)</td>
<td>Structured Lab: Object Gratifying To Handle (OGH) NB: OGH is an on-going project that will take time to complete. There will be weekly check-ins to evaluate progress.</td>
<td><strong>ASSIGNMENT 2: Object Gratifying to Handle (OGH)</strong> Due 8/13/2024 Online Submission 9:00 AM &amp; Classroom Submission 10:30 AM</td>
</tr>
</tbody>
</table>

**OGH is an on-going project that will take time to complete. There will be weekly check-ins to evaluate progress.**
First OGH Check-In: 7/2/24 @ 10:30 AM
Second OGH Check-In: 7/11/24 @ 10:30 AM
Third OGH Check-In: 7/18/24 @ 10:30 AM
Fourth OGH Check-In: 7/25/24 @ 10:30 AM
Fifth OGH Check-In: 8/6/24 @ 10:30 AM
<table>
<thead>
<tr>
<th>Week 2 Coaching</th>
<th>Install Fusion and Engineering Drawings in Fusion</th>
<th>N/A</th>
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<tbody>
<tr>
<td>Introduction to Computer Aided Design (CAD)</td>
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**Week 2.1 Lecture 7/2/24**  
Simple Machines and Mechanisms  
Part 1: Leverage  
MEDGi Part 1  
**In class exercises:**  
MEDGi Generic and Applied to Machines  
**Due Today:** Assignment 1, First OGH Check-In  
**ASSIGNMENT 3: Machine A, Cardboard Planar Machine**  
Due 7/9/2024  
Online Submission 9:00 AM & Classroom Submission 10:30 AM

**Week 2.2 Lecture NO CLASS INDEPENDENCE DAY**  
**NO CLASS INDEPENDENCE DAY**

**Week 3 Coaching**  
Fusion Sketches  
**Practice creating sketches in CAD**  
N/A

**Week 3.1 Lecture 7/9/24**  
Simple Machines and  
**MEDGi Pt 2: Analytic and Generative Cognition**  
Media Models Pt 1 or “Why We Sketch, Why we Prototype, Why We CAD”  
**Due Today:** Assignment 3  
**ASSIGNMENT 4: Machine B, Cardboard Planar Machine MEDGI**
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<table>
<thead>
<tr>
<th>Mechanisms</th>
<th>In-Class Media Models Exercises Generic and Applied to Machines</th>
<th>Due 7/16/2024</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part 2: Torque MEDGI Part 2</td>
<td></td>
<td>Online Submission 9:00 AM &amp; Classroom Submission 10:30 AM</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week 3.2 Lecture 7/11/24</th>
<th>In-Class Media Models Exercises Generic and Applied to Machines</th>
<th><strong>Due Today</strong>: Second OGH Check-In</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media Models Part 2</td>
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</table>

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<thead>
<tr>
<th>Week 4 Coaching 3D Features in Fusion</th>
<th>Practice simple functions, such as Extrude, Revolve, Sweep, Loft to create structures from sketches</th>
<th>N/A</th>
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</table>

<table>
<thead>
<tr>
<th>Week 4.1 Lecture 7/16/24</th>
<th>In Class Exercises: Dimensions of Engagement Generic and on Machines</th>
<th><strong>Due Today</strong>: Assignment 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions of Engagement</td>
<td></td>
<td>ASSIGNMENT 5: Machine C, Cardboard Spatial Machine MEDGI</td>
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<td>Due 7/23/2024</td>
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<td></td>
<td></td>
<td>Online Submission 9:00 AM &amp; Classroom Submission 10:30 AM</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Week 4.2 Lecture 7/18/24</th>
<th>In Class Exercises: Four Forces Generic (Camera Redesign) and on Machines</th>
<th><strong>Due Today</strong>: Third OGH Check-In</th>
</tr>
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<tbody>
<tr>
<td>Transformations The Four Forces</td>
<td>Isometric and Orthographic Views</td>
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</tr>
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</table>
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<table>
<thead>
<tr>
<th>Week 5</th>
<th>Coaching</th>
<th>Assemblies</th>
<th>Building and joining components in Fusion to make assemblies</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Week 5.1</strong></td>
<td>Lecture</td>
<td>7/23/24</td>
<td>In Class Exercises: The Eight Meta-Transformations Generic and on Machines</td>
<td><strong>Due Today:</strong> Assignment 5</td>
</tr>
<tr>
<td></td>
<td>Transformations</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>The Eight Meta Transformations</td>
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<tr>
<td><strong>Week 5.2</strong></td>
<td>Lecture</td>
<td>7/25/24</td>
<td>In Class Exercises: Theory and Practice of Frameworks</td>
<td><strong>Due Today:</strong> Fourth OGH Check-In</td>
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<td></td>
<td>Mid-Term Review</td>
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<tr>
<td><strong>Week 6.1</strong></td>
<td>Lecture</td>
<td>7/30/24</td>
<td>Static Connections and Connections in Motion (Bushings and Bearings) In Class Exercises: Theory and Practice Connections Generic and on Machines</td>
<td><strong>Due Today:</strong> Assignment 6</td>
</tr>
<tr>
<td></td>
<td>Connections 1</td>
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<td></td>
<td>Mid-Term Review</td>
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<tr>
<td><strong>Week 6.2</strong></td>
<td>Lecture</td>
<td></td>
<td>Mid-Term Exam</td>
<td>N/A</td>
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Due 7/30/2024
Online Submission 9:00 AM & Classroom Submission 10:30 AM

**ASSIGNMENT 7: Machine E, Laser Cut & 3D Printed Spatial Machine MEDGI**

Due 8/15/2024
Online Submission 9:00 AM & Classroom Submission 10:30 AM
<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/1/24</td>
<td>Mid-Term Exam</td>
<td></td>
</tr>
<tr>
<td>Week 7.1</td>
<td>Lecture</td>
<td>Paradigms of Connection</td>
</tr>
<tr>
<td>8/6/24</td>
<td>Connections 2</td>
<td>In Class Exercises: Theory and Practice Connections Generic and on Machines</td>
</tr>
<tr>
<td>Week 7.2</td>
<td>Lecture</td>
<td>Mid-Term Exam Debrief</td>
</tr>
<tr>
<td>8/8/24</td>
<td>Mid-Term Exam Debrief</td>
<td></td>
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<tr>
<td>Week 8.1</td>
<td>Lecture</td>
<td>Final Review of Objects Gratifying to Handle</td>
</tr>
<tr>
<td>8/13/24</td>
<td>Recap of Quarter</td>
<td></td>
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<tr>
<td>Week 8.2</td>
<td>Lecture</td>
<td>Final Review of Machine Progression</td>
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<tr>
<td>8/15/24</td>
<td>Last Day of Classes</td>
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<tr>
<td><strong>BIG CLEAN</strong></td>
<td><strong>[DATE TBD]</strong></td>
<td><strong>The Big Clean is REQUIRED, no show will result in 50 point deduction from your final grade!</strong></td>
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<tr>
<td></td>
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<td>Please show up for an <em>one-hour</em> session during the allotted time in either the wood lab or room 36 and get checked off! Let’s collectively clean the PRL!</td>
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</tbody>
</table>