

## ISD 520 - Introduction to Systems Engineering:

### Professor:

Robert F. Bordley

**Email:** [rbordley@umich.edu](mailto:rbordley@umich.edu)

**Office hours:** Monday, 9:30-10:30am EDT (and by appointment)

### GSIs:

Nizar Ahamed

**Email:** [nizar@umich.edu](mailto:nizar@umich.edu)

**Office hours:** Wednesday, 7-8 pm EDT (and by appointment)

Syed Baqar

**Email:** [razasyed@umich.edu](mailto:razasyed@umich.edu)

**Office hours:** Saturday, 10-11 am EDT (and by appointment)

### Class Project Team:

Phil Oh

**Email:** [phil.oh@xlydn.net](mailto:phil.oh@xlydn.net)

**Office hours:** by appointment

Tom Tecco

**Email:** [thomas.tecco@xldyn.net](mailto:thomas.tecco@xldyn.net)

**Office hours:** by appointment

All office hours will be held via WebEx (<https://sites.google.com/a/umich.edu/isd-public/isd-520-web-conferencing> (Links to an external site.)).

Lecture recordings will be released for viewing each Tuesday and Thursday morning during the semester. **Note:** Professor Bordley **does allow** lecture recordings to be downloaded for offline viewing.

### Course Description:

The course serves as an introduction to systems engineering. We will discuss each step of the systems engineering process, including problem definition, stakeholder identification, elicitation of stakeholder objectives, definition of system requirements, concept generation, concept selection, zig zag design, system verification, and system validation.

**Learning objectives:** As a result of this course, students will be able to:

- Analyze the sequence of steps involved in the systems engineering of complex systems
- Apply the techniques used in each step in the systems engineering process
- Apply model-based systems engineering to a simple problem
- Explain the concept of zig zag design
- Evaluate the role of safety in systems engineering

### Required Textbook & Materials

None.

### ISD Software Access Policy

This course requires that you have access to XLDyn software. Historically, access issues are most common for online students and for any non-College of Engineering students. XYLDYN can be accessed by accessing the CAEN lab software:

<https://sites.google.com/a/umich.edu/isd-public/remotesoftware/connecting-to-caen-remote-software-with-webclient> (Links to an external site.)

For installing XLDyn add-in to Excel, please follow these steps:

<https://sites.google.com/a/umich.edu/isd-public/remotesoftware/xldynsetup> (Links to an external site.)

It is critical that you are able to log in to this software successfully PRIOR to your homework submission. As such, your fourth homework requires the submission of a screenshot documenting your access to XLDyn and successful installation in Excel. (You will receive more detail on XLDyn in the week preceding this assignment.)

If you have any issue connecting to the software, please contact [isd-instructionalsupport@umich.edu](mailto:isd-instructionalsupport@umich.edu) and copy Prof. Bordley on the message.

### Grade Distribution

Participation and Piazza posts	15%
Homework	20%
Midterm Exam (closed book/notes)	20%
Final Exam (closed book/notes)	30%

Project	15%
Total	100%

### Grading Scale

This course follows a standard ISD grading scale of A, B, C, D, and E. Grades will be assigned as follows:

A+ 97-100	B+ 87-89	C+ 77-79	D+ 67-69	E 59 and below
A 93-96	B 83-86	C 73-76	D 63-66	
A- 90-92	B- 80-82	C- 70-72	D- 60-62	

The minimum grade ranges may be adjusted based on class performance.

### Piazza posting guidelines

Students are asked to make two `substantive` Piazza posts each week based on the discussion questions raised in the lectures (or on other relevant topics). For each post, be sure to select the proper folder and use the following format for the summary field: Discussion ##: Post title. This will facilitate follow-up discussion and grading.

Ideally, one post would be original while the other would be a comment on someone else's post. Substantive posts will be a minimum of 20 words, and it is not unusual for substantive posts to be 100 words or longer (there is no upper bound on how long a Piazza Post can be). Simple statements of agreement or disagreement about someone else's post are not substantive. However such statements would generally be considered substantive if they were coupled with a more detailed explanation (or an example) of why there was agreement or disagreement. The purpose of the posts is to show that you are engaged in thinking about the course content; they will not be evaluated on whether they are `right` or `wrong.`

### Homework

There will generally be one homework assignment per week. Homework tasks are chosen to help reinforce the lecture content and support you in achieving the course learning objectives. You can find further information on the homework assignment in Canvas.

The GSIs will generally return graded assignments one week after they are submitted.

### Project requirements

The class project uses SysML (systems modeling language) in the design of a windmill in Ann Arbor, Michigan. Individuals will be given access to an excel-based software for implementing this language through CAEN as well as through download on their computers (since problems have occurred in loading the software on MACs, please alert the instructor if you encounter such problems). The assignment will involve specifying requirements and how those requirements are verified. Individuals will be organized into teams with each team e-mailing their results to the instructor no later than the last day of class. Since participants are from Berlin, US (EDT and CDT), India and Los Angeles, individuals will be provided with whatever information is helpful to form effective teams. The size of the teams is preferably three to five although smaller teams are also allowed. You will be asked to form your teams and provide proof of software download on your computers on the fourth homework due on June 2<sup>nd</sup>. Please contact the instructor before this date about any issues related to either software or forming teams.

### **Make-up and Late Work Policy**

One late assignment, with prior communication, will be accepted without penalty up to 7 days late. Any further late assignments will be penalized 5% per day that they are late. If you believe that your particular circumstances warrant an extension on an assignment, please contact the GSI/Professor at least 24 hours prior to the due date to discuss.

### **Accessibility**

ISD faculty are committed to ensuring equal access to learning for students with disabilities. The University of Michigan SSD Office provides accommodations and services free of charge to students that register. Depending on the type and severity of the disability, the SSD Office makes every effort to provide the appropriate accommodation for academic success. Registered SSD students can arrange to receive services through their disability coordinator.

<https://ssd.umich.edu/topic/our-services> (Links to an external site.)

### **The College of Engineering Honor Code**

All students in the class are presumed to be decent and honorable, and all students in the class are bound by the College of Engineering Honor Code. You may not seek to gain an unfair advantage over your fellow students; you may not consult, look at, or possess the unpublished work of another without their permission; and you must appropriately acknowledge your use of another's work. Any violation of the honor policies appropriate to each piece of course work will be reported to the Honor Council, and if guilt is established penalties may be imposed by the Honor Council and Faculty Committee on Discipline. Such penalties can include, but are not limited to, letter grade deductions or expulsion from the University. As your course instructor, I reserve the right for additional deductions of points for anyone found guilty of an honor code violation.

Homework Assignments: You may discuss individual homework assignment with your fellow students at the conceptual level, but must complete all calculations and write-up, from scrap to final form, on your own. Verbatim copying of another student's work is forbidden. You may not consult homework

solutions from a previous term unless they are made available in a publicly accessible form. All group work is to be completed only within your own group. Your group can receive help **only** from the course instructors. At no time may you receive help from someone who is not a current instructor. You cannot speak with other groups about the problems, conceptually or otherwise, and you may not at any time look at, borrow, or possess another group's work.