LLC SYLLABUS – WINTER 2026

How Things Are Made

Wednesday mornings 10 am – 12 noon
January 7 – February 25

Hybrid: classes in person at Shriners Center and simultaneously on Zoom

Coordinator Art Norwalk
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Technical Co-Coordinator Tom Colby
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Description

We'll examine the tools, materials and processes needed to bring a product from concept to delivery. In some sessions, we'll look at the many steps involved in making a single product or product family. In other sessions, we'll explore how a particular tool or process works and how it's used to help make many different products. And one very special session will be a visit to the shop of a custom boat builder in Providence.

No technical background is required.

Class Format

Each two-hour class (except the field trip) will be divided into two 55 minute segments. The first segment will run from 10:00 to 10:55, followed by a ten-minute break. The second segment will run from 11:05 to 12. Your cooperation is requested in keeping to this schedule so that both segment leaders get their full time allotments.

Course participants will be asked to lead a segment selected from the list beginning on page 4. This is encouraged but not required; many members find that preparing for and leading a class is one of the most enjoyable and rewarding parts of LLC. Topics not on the list may be substituted with approval of the coordinator. In addition to your topic, please select the date(s) that would work for you. Please send your topic and date selections to the coordinator ASAP as both topics and dates are first come, first served.

Considering the nature of the course, visual elements – photos, diagrams, videos, etc. -- are highly recommended and readily available online, many in YouTube.

Segment Leadership Guidelines

In LLC's collaborative learning system, each course participant is encouraged to own an hour, leading the entire class in learning about and discussing your topic. Your segment leadership can take the form of:

- arranging a talk by a guest speaker (in-person or Zoom)
- showing one or more videos
- telling the story through slides and your commentary
- posing provocative questions to the group and leading discussion
- other ideas are welcome

Your leadership (in whichever format you choose) should last no longer than 30-35 minutes, leaving 20-25 minutes for discussion (the most popular part of the class for many LLC members). Your opinions are welcome, but not required, as part of your leadership; they often help stimulate discussion.

If you're doing a slide presentation or preparing questions, please use relevant research material from a variety of sources, not just a Wikipedia article (though that can be an excellent starting point, especially the source citations at the end of the articles.

Also, PLEASE don't simply read the text on your slides to the class. Take time in advance to become very familiar with the material – yes, that means rehearse – so you can look up and make eye contact with your fellow participants. Tell the class at the start whether you're comfortable taking questions along the way or prefer to hold them until the end.

Do not put your entire script on slides. It's impossible for participants to read the screen and follow what you're saying at the same time. Use illustrations, if appropriate, or an outline of brief talking points to keep you and the class on track. Use large type for visibility – 24 point minimum. Images and/or videos will be especially useful to illuminate your topics.

If you are using any a/v materials, please arrive for class 15-20 minutes early for testing so we don't waste class time getting things ready to show. Help is available for any audio-visual tools you'd like to use. See Technical Support below.

If you have any handouts, suggestions for additional reading or videos to view, please email them to all class members (or to the coordinator for re-sending) at least one week in advance.

Technical support

If you plan to use a slides created in PowerPoint, PDF, Google slides or Keynote, please send your finished file to coordinator Art Norwalk (artnorwalk@gmail.com) and co-coordinator Tom Colby (tom@colbyhome.com) at least two days before your presentation and bring a copy to class on a thumb drive as backup. You can control your slides, or a coordinator will run the slides for you, advancing them when you ask – your choice.

The same is true if you want to show a video from YouTube or another web source: send the link to Art and Tom in advance for testing.

If you need help creating a slide presentation or any other visual aids, contact one of the coordinators at least two weeks before your appointed date.

Zoom & Hybrid etiquette

If you're in the in-person section of a hybrid course, it's important to keep extraneous noise to an absolute minimum. That means no side conversations or paper shuffling – the Owl will find you and distract the whole class.

If you're on Zoom and not actually talking to the class, please Mute yourself. The rest of us don't want to hear your phone conversation or your dog barking; the coordinator may Mute you if this happens. When you start speaking, you'll likely need to be reminded to Unmute; it happens to everyone so don't be embarrassed.

When you want to ask a question or contribute to a discussion, you can raise (but don't wave) your hand in view of the camera, or use the Raise Hand graphic found by clicking Reactions at the bottom of your Zoom screen. The coordinators will attempt to call on each person in the order that hands went up; however they will discourage any class members who appear to be dominating the conversation.

Topic & Date selection – First Come, First Served

Beginning on the next page you'll find a list of topics with suggestions for aspects you might wish to cover. On the following page is a schedule of dates, topics and times that will be filled in as selections are made. **Please reply to coordinator Art Norwalk (artnorwalk@gmail) at your earliest convenience with your preferences; dates and topics are first come, first served**. The coordinators will do their best to accommodate unforeseen schedule changes later on.

There will be several iterations of the schedule in the coming days as people make their choices or change dates, so please keep track of the latest emailed versions.

Topics and Suggested Questions to Explore

The topics below do not need to be covered in the order shown. The "possible questions" are suggestions; you may take the topic you select in a different direction. There are a few more topics than dates, so there should be something for everyone.

To start your research, I highly recommend chatgpt.com. This free AI site gives clear answers to any questions, including suggestions for followup questions you might have. I found it very helpful and easy to use. [https://theconversation.com/the-chatgpt-effect-in-3-years-the-ai-chatbot-has-changed-the-way-people-look-things-up-270143]

Once you select the topic you'd like to cover, go on to the list of dates and times and check your availability. Then email your choices for topic and available date(s) to me (artnorwalk@gmail.com) ASAP. Both topic and date are first come, first served, so you may want to have a second choice of topic in mind in case your first choice has been taken.

You are welcome to suggest a topic not on the list and we will discuss how it fits with the rest of the topics and goals of the course.

Team presentations are also welcome.

TOPIC	POSSIBLE QUESTIONS TO EXPLORE
Elements of control systems	Why are they needed? What do they control? What elements are common to all control systems? What elements are found only in special applications?
Control systems at work	Discuss uses in one or more of HVAC, assembly, motor vehicles, automation, transportation, power production, robotics, building/facility operations
Flow control: hydraulics & pneumatics	Using liquids and gases to create force and motion. How they work. Advantages & disadvantages of each. Examples.
Rare Earth Minerals	What are they? Where found/where used/why important? What are the environmental, economic, technological and political issues associated with them?
Oil and petrochemical refining & processing	What processes are required to convert crude oil into fuels and other useful products? How are they measured and controlled? Environmental, economic and political issues.
Robotics	What are industrial robots? Different types of robots. What kinds of factories use robots? What functions do they perform effectively?
Sustainable energy sources	Solar. Wind. Geothermal. Hydro. Other. How are they made? How do they work? How are they controlled? Batteries and other energy storage.
Custom manufacturing machines	What are they? Why do companies use them? Examples of kinds of custom machines needed for particular manufacturing needs.
Industrial air, water & ground pollution controls	Technical, legal and regulatory issues. Today's technologies
Sourcing materials & components; effects of tariffs	Supply chain issues: too soon, too late. Tariff costs, predictability
Metal forming	CNC machining, 3D printing, casting, forging, rolling, extrusion, specialized processes. Where and how they are used.
Plastic forming	Injection molding, blow molding, extrusion, blown

	film. Where and how they are used?
The humble conveyor belt	From a simple device to move work from one station to the next, to a customized, sensor-guided, computer controlled high speed system with many uses
Joining/Assembly	Welding, soldering, mechanical fastening, adhesives, etc. From the smallest pieces to the largest machines, vehicles, etc.
Creating a manufacturing system	The many steps between design and delivery. What's involved in deciding how a product will be made and who's in charge?
The many roles and types of sensors	What they do and why machines (and people) wouldn't know what to do without them.
What will AI's role be in making things?	What does AI do in industry today? What will it do tomorrow? Is AI more than a tricked-up search engine? Will the AI bubble burst?
Getting quality right	QA-Quality Assurance, QC-Quality Control, Continuous Improvement. What are they? What do they do best? What are their tools?
Complex manufacturing systems	What kinds of machines, support tools and controls are required for such complex products as food & beverages, pharmaceuticals, etc.

Schedule – see updated schedule in separate emails

The coordinator will fill in agreed topics, owners & dates and circulate schedule updates.

Date	Time	Subject	Owner(s)
Jan 7	10	Joining/assembly	Stuart Einhorn
	11		
Jan 14	10	Oil & Petrochem processing	Jim Delaney
	11	How nuclear weapons are made	Bob Paradis
Jan 21	10		
	11	Custom manufacturing machines	Jim Heath
Jan 28	10	Granite from quarry to kitchen	Liz Kaplan
	11		
Feb 4	10	Custom boat building	Gerald “Shep” Shapiro
	11	Field trip	
Feb 11	10	The humble conveyor belt	Deb Gardner
	11	Metal forming	Roberta Arsac
Feb 18	10	Rare Earth Minerals	Dick Brush
	11	Sustainable energy sources	Virginia Vaughan
Feb 25	10	Robotics	Mark Guyer
	11	How pinball machines are made	Joan Hausroth

If you can’t keep an agreed date, please inform the coordinator as early as possible.

If severe winter weather is forecast, watch your email for notice of a shift to all-Zoom.