



Receive hands-on training in diagnosing and solving your  
polymer R&D problems!

The American Chemical Society Presents...

# ***Polymer Chemistry: Principles and Practice***

## Seven Compelling Reasons to Register for This Course:

1. Understand Practical Uses of Various Polymer Characterizations Methods and the Structure-Property Relationships.
2. Learn How Polymers Are Synthesized.
3. Work and Consult with Renowned Authorities in the Polymer Field.
4. Gain Hands-on Experience by Performing or Discussing a Variety of Experiments in the Laboratory Working in Small Groups.
5. Learn to Diagnose and Solve Practical Problems in Polymer Synthesis, Characterization, Mechanical Properties and Processing.
6. Gain a Remarkable Breadth of Knowledge of Polymer Science- Covering a Variety of Topics from Polymer Synthesis to Polymer Processing.
7. Solve Your Practical, Work-Related Problems by Discussing Your Work with Polymer Experts.

## Upcoming sessions:

Sunday – Friday  
December 5-10, 2021  
March 13-18, 2022  
Aug 14-19, 2022  
December 4-9, 2022

**The course is held at Virginia Tech, Blacksburg, Virginia**

Register Today at: [www.ProEd.acs.org](http://www.ProEd.acs.org)

Enrollment in this exceptionally popular course  
is strictly limited to 30 participants. Sessions sell  
out quickly. Don't delay!



## Who Should Attend?

Anyone currently working or beginning to work with polymers and their applications, including bachelor degree through Ph.D. level research chemists, engineers, physicists, or technicians should take this course. Managers in the polymer industry will greatly benefit from this in-depth, lecture-laboratory course. No prior knowledge of polymer science is assumed.

## What You'll Learn

- Polymer synthesis, molecular weight determination and characterization of rheological and viscoelastic behavior
- Polymer structure and morphology
- Mechanical testing of elastomers, plastics, and fibers
- Examples from the fields of adhesion, composites, films, coatings, biomaterials, etc.
- Measurement of various properties of polymers, which are later discussed as functions of chemical composition, molecular weight, topology, morphology, etc.

## Comprehensive Program Agenda

### SUNDAY

4:30	–	5:00	PM	Registration
5:00	–	5:50	PM	Welcome and Introductions (Bortner)
6:00	–	7:15	PM	Polymer Terminology and Design Parameters (Long)
7:30	–	9:00	PM	Step-Growth Polymerization: Polyesters, Polycarbonates & Engineering Thermoplastics (Long)

### MONDAY

8:00	–	9:00	AM	Chain-Growth Polymerization: Mechanism and Homopolymerization (Long)
9:10	–	10:10	AM	Free Radical Copolymerization (Matson)
10:20	–	11:10	AM	Thermosets (Long)
11:20	–	12:20	PM	The Amorphous State and Mechanical Testing of Polymeric Materials (Bortner)
12:20	–	1:10	PM	Lunch Together @ The Inn at Virginia Tech
1:25	–	3:00	PM	Polymerization Labs, Hahn Hall South (Matson)
3:30	–	4:25	PM	Living Polymerization (Matson)
4:35	–	5:25	PM	Ring-Opening Polymerization (Matson)
5:25	–	7:00	PM	Dinner, your choice
7:00	–	8:15	PM	Characterization of Morphology (Moore)
8:30	–	10:00	PM	Characterization of Morphology (Moore)

## TUESDAY

8:00	–	9:15	AM	Block and Graft Copolymers (Long)
9:45	–	11:45	AM	Polymer 3D Printing and Characterization Lab, Goodwin Hall (Long)
12:00	–	1:00	PM	Lunch Together @ The Inn at Virginia Tech
1:00	–	2:15	PM	Thermal Analysis (Moore)
2:25	–	3:25	PM	Polyolefins: Synthesis, Structures, and Properties (Matson)
3:45	–	5:15	PM	Polymerization and Characterization Labs, Hahn Hall South (Long/Moore)
5:35	–	6:50	PM	Influence and Determination of Molecular Weight and Molecular Weight Distribution (Long)

**Tuesday Evening Free**

## WEDNESDAY

8:00	–	9:10	AM	Design of Segmented Copolymers: Polyurethanes (Long)
9:20	–	10:10	AM	Viscoelasticity and Free Volume (Moore)
10:20	–	11:20	AM	Accelerated Testing (Moore)
11:20	–	12:20	PM	Calculations in Polymer Science and Engineering (Moore) (calculators/laptops needed)
12:20	–	1:15	PM	Lunch Together @ The Inn at Virginia Tech
1:15	–	2:15	PM	Polymer Rheology and Measurement Techniques (Bortner)
2:35	–	3:45	PM	TGA, SAXS and WAXS Lab, Kelly Hall (Moore)
4:00	–	5:30	PM	Thermal Analysis Lab, Hahn Hall South (Moore/Bortner)

**Wednesday Evening Free**

## THURSDAY

8:00	–	9:20	AM	Polymer Rheology and Processing (Bortner)
9:45	–	12:00	AM	Capillary Rheology and Processing Lab, Hahn Hall South and CRC (Bortner)
12:15	–	1:00	PM	Lunch Together @ The Inn at Virginia Tech
1:15	–	1:55	PM	SEC Lab, Hahn Hall South (Matson)
2:15	–	4:30	PM	Effects of Internal and External Variables on Polymer Rheology and Elastic Effects in the Viscous State (Bortner)
5:00	–	7:00	PM	<b>ACS Networking Event, Zeppoli's Italian Restaurant</b> , casual dress (Sponsored by the American Chemical Society)

## FRIDAY

8:30	–	9:00	AM	Degradation and Stabilization of Polymers (Matson)
9:00	–	10:00	AM	Strain-Induced Crystallization of Polymers (Bortner)
10:15	–	11:15	AM	Polymeric Biomaterials (Matson)

## About the Faculty

**Dr. Timothy E. Long** received his Ph.D. in Chemistry from Virginia Tech under the direction of Prof. James McGrath, and he subsequently joined both Eastman Kodak and Eastman Chemical companies for eight years upon graduation. He joined the faculty in the Department of Chemistry at Virginia Tech, where he also served as the Director of the Macromolecules Innovation Institute until 2019. In 2020, Prof. Long accepted an interdisciplinary faculty position across the School of Molecular Sciences (SMS) and the School for Engineering Matter, Transport, and Energy (SEMTE) at Arizona State University (ASU) where he launched and currently leads the Biodesign Center for Sustainable Macromolecular Materials and Manufacturing (SM3).

In addition to over 400 peer-reviewed publications, his research awards include:

- 2022 Paul J. Flory Award
- 2020 Virginia Outstanding Faculty Award
- 2015 Virginia Scientist of the Year
- 2010 Virginia Tech Alumni Research Award
- ACS PMSE Collaborative Research Award
- PSTC Carl Dahlquist Award
- 2019 ACS Rubber Division Thermoplastic Elastomer Award
- ACS POLY Mark Scholar Award

His most recent research efforts address the need for tailored advanced macromolecules for advanced manufacturing (3D printing), including vat photopolymerization, direct ink write, binder jetting, powder bed fusion, and melt extrusion. His interdisciplinary research establishes fundamental polymer structure-property-processing relationships with a lens of sustainability.

**Dr. Robert B. Moore**, Professor of Chemistry and Director of the Macromolecules Innovation Institute (MII), Virginia Tech, is a Physical Polymer Chemist with fundamental interests in Polymer Morphology, Small-Angle X-Ray Scattering, and Thermo/Mechanical Properties. Research in the Moore group is focused on processing-morphology-property relationships of functionalized, semi-crystalline polymers (especially ionomers) to understand the role of specific interactions in morphological development. The Moore research group is actively involved in discovery and development of new polymeric materials for applications in proton exchange membrane fuel cells, solvent-polymer interactions in semicrystalline, thermoreversible gels, nanostructured polymer aerogels and polymer gel electrolytes for energy conversion and storage, graphene-based materials for electrochemical processes and sensors, and compatibilized blends, composites, and nanocomposites.

**Dr. Michael J. Bortner** is an Associate Professor in the Department of Chemical Engineering and a Faculty Fellow in the College of Engineering at Virginia Tech. Dr. Bortner has a decade of industry experience working in polymer and composite materials and process development. He was a Senior Process Engineer at Nuvotronics and a VP of Manufacturing Process Development at NanoSonic before returning to Virginia Tech as a Professor in the Department of Chemical Engineering. His interdisciplinary research team focuses on process-structure-property relationships in polymers and polymer composites, coupling rheology and morphology to guide development of novel chemistries and design of new manufacturing processes.

**Dr. John B. Matson**, Professor of Chemistry, Virginia Tech, focuses on the synthesis of polymers with applications in biology, self-assembly, and sustainability. Current efforts include polymers made from sustainable and/or renewable sources and polymers designed to degrade in response to a specific stimulus; macromolecular and supramolecular materials for use in drug delivery and tissue engineering; and synthesis and fundamental understanding of polymers with unique morphologies.

## Course Fee

Check the ACS website to see current member and non-member pricing

[www.ProEd.acs.org](http://www.ProEd.acs.org)

## Here's What Previous Participants Have to Say About This Course

"This group of instructors does an incredible job. Synthesis blends into characterization and then into practical engineering seamlessly. The lectures were both lighthearted and intense."

--Mitch Refvik, Research Team Leader, Chevron Phillips Chemical Co.

"Since my formal training was not in polymer chemistry, this course was valuable to me. It helped me gain a more comprehensive understanding of polymer science. The information I learned will be quite helpful to me in my research program."

--Walt Kosar, Ph.D., Sr. Research Scientist, Technical Polymers Group, Arkema, Inc.

## Course Location

All lectures are at the [Inn at Virginia Tech](#) (IVT), second floor, located near campus. Laboratory sessions are held in Hahn Hall South, Kelly Hall, Goodwin Hall, and the CRC. A guide will escort participants to labs, a van will be provided at the front door of the IVT immediately following lecture.

## Lodging Information

The guestroom blocks will be held until one month before each session. To ensure that you are able to book a room at this special rate, we urge you to make your hotel reservation as soon as possible, mentioning that you are an American Chemical Society short course participant.

The closest airport is in Roanoke, VA, about 45 minutes drive from Blacksburg. For those wishing to rent a car, all major rental car agencies have facilities at the Roanoke Airport. Alternatively, bus service is available through Smart Way Bus ([www.smartwaybus.com](http://www.smartwaybus.com)) which will bring you directly to the Virginia Tech campus.

## Payments/Cancellations

All registrations must be prepaid. You may register online or via mail. [Please go to the ACS website for full registration instructions.](#)

If you need to cancel your enrollment, you may do so up to ten (10) business days before the session and still receive a refund of your registration fee, minus a \$50 administration fee. The specific cancellation date will be provided in your confirmation letter. After that time, no refund or credit will be issued but you may have a co-worker attend in your place.

# See you in Blacksburg!



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