

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

American Chemical Society Presents . . .



Polymer Chemistry: Principles and Practice

Meeting Location:



Blacksburg, Virginia

Seven Reasons to Register for This Course:

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

Register Today at: 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.

Note: Because of the amount of lab work, enrollment is strictly limited to 30 people. Each participant should bring comfortable clothing, arriving early enough on Sunday to have a meal and be well rested for the first evening session.

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

Polymer Chemistry: Principles and Practice

All lectures are at the Inn at Virginia Tech, second floor. Laboratory sessions will be in **Hahn Hall North, Hahn Hall South, Kelly Hall (formerly ICTAS I) and ICTAS II** as shown below. A guide will escort participants to labs. In case of inclement weather, a van will be provided at the front door of The Inn immediately following lecture.

SUNDAY

<i>ALL</i>	4:30	–	5:00	PM	Registration
<i>ALL</i>	5:00	–	5:50	PM	Welcoming and Outline of Course (Long)
<i>ALL</i>	5:50	–	6:00	PM	Break
<i>ALL</i>	6:00	–	7:15	PM	Survey of Polymer Science (Long)
<i>ALL</i>	7:15	–	7:30	PM	Break
<i>ALL</i>	7:30	–	9:00	PM	Introduction to Step-Growth Polymerization (Long)

MONDAY

<i>ALL</i>	8:00	–	9:00	AM	Thermosets (Riffle)
<i>ALL</i>	9:00	–	9:10	AM	Break
<i>ALL</i>	9:10	–	10:20	AM	Synthesis of Polymers, Free Radical Polymerization (Long)
<i>ALL</i>	10:20	–	10:30	AM	Break
<i>ALL</i>	10:30	–	11:30	AM	Free Radical Copolymerization (Riffle)
<i>ALL</i>	11:30	–	11:40	AM	Break
<i>ALL</i>	11:40	–	12:30	PM	Living Polymerization (Riffle)
<i>ALL</i>	12:30	–	1:15	PM	Lunch Together
<i>ALL</i>	1:25	–	3:00	PM	Polymerization Labs, Kelly Hall (Riffle)
<i>ALL</i>	3:00	–	3:20	PM	Return to Lectures - Break
<i>ALL</i>	3:20	–	4:15	PM	Introduction to the Amorphous State of Polymeric Materials (Wilkes)

ALL	4:15	–	4:25	PM	Break
ALL	4:25	–	5:15	PM	Ring-Opening Polymerization (Riffle)
ALL	5:15	–	7:00	PM	Dinner, your choice
ALL	7:00	–	8:15	PM	Morphology (Moore)
ALL	8:15	–	8:30	PM	Break
ALL	8:30	–	10:00	PM	Characterization of Morphology (Moore)

TUESDAY

ALL	8:00	–	9:15	AM	Block and Graft Copolymers (Riffle)
ALL	9:15	–	9:30	AM	Break
ALL	9:45	–	11:45	AM	Polymerization Labs, ICTAS II (Long)
ALL	12:00	–	1:00	PM	Lunch Together
ALL	1:00	–	2:15	PM	Thermal Analysis (Moore)
ALL	2:15	–	2:25	PM	Break
ALL	2:25	–	3:15	PM	Polyolefins (Long)
ALL	3:20	–	5:00	PM	Polymerization Labs, Hahn Hall South 3001 and 3009 (Long/Moore)
ALL	5:00	–	6:30	PM	Molecular Weight Characterization and Influence (Long) Tuesday Evening Free

WEDNESDAY

ALL	8:00	–	9:20	AM	Polymer Rheology (Wilkes)
ALL	9:20	–	9:30	AM	Break
ALL	9:30	–	Noon		Thermal Analysis Lab, 307 Hahn Hall North (Moore/Long)
ALL	12:00	–	1:00	PM	Lunch Together
ALL	1:00	–	1:45	PM	SEC/APC Lab, 285 ICTAS II (Long)
ALL	2:00	–	2:15	PM	Break
ALL	2:15	–	3:15	PM	Viscoelasticity and Free Volume (Moore)
ALL	3:30	–	6:00	PM	Rheology, Crystallinity and Physical Aging Discussions (Wilkes) Wednesday Evening Free

THURSDAY

ALL	8:00	–	9:00	AM	Polymer Rheology (Wilkes)
ALL	9:00	–	9:10	AM	Break
ALL	9:10	–	10:00	AM	Polyurethanes (Long)
ALL	10:00	–	10:15	AM	Break
ALL	10:15	–	11:15	PM	Accelerated Testing (Moore)
ALL	11:15	–	12:15	PM	Mechanical Testing I (calculators/laptops needed) (Moore)
ALL	12:15	–	1:00	PM	Lunch Together
ALL	1:00	–	2:00	PM	Mechanical Testing II (Moore)
ALL	2:00	–	2:15	PM	Break
ALL	2:15	–	4:30	PM	Rheology and Crystallization Lectures (Wilkes)
ALL	5:00	–	6:30	PM	Wine and Cheese Reception, Bull & Bones, casual dress. Vans will transport participants to the reception. (Sponsored by the American Chemical Society)

FRIDAY

ALL	8:00	–	9:15	AM	Strain-Induced Crystallization of Polymers (Wilkes)
ALL	9:15	–	9:30	AM	Break
ALL	9:30	–	10:30	AM	Introduction to Biomaterials (Riffle)
ALL	10:30	–	11:30	AM	Degradation and Stabilization of Polymers (Riffle)

Polymer Synthesis and Characterization Experiment Schedule

Monday

Polymerization Labs: (1:25 pm - 3:00 pm)

Kelly Hall 140	Interfacial Polymerization of Nylon-6,10
Kelly Hall 140	Preparation of Nylon-6 by the Ring Opening Polymerization of ϵ -Caprolactam
Kelly Hall 140	Epoxy Resin Curing
Kelly Hall 140	Polystyrene – Free Radical Suspension
Kelly Hall 140	Polystyrene – Free Radical Emulsion

Tuesday

Polymerization Labs: (Rotating - 9:45 am – 11: 45 am)

ICTAS II 275	Electrospinning and Bench Top SEM
ICTAS II 275	Reactivity Ratios – <i>in-situ</i> FTIR
ICTAS II 275	Gel Electrophoresis (Cell Culture Lab)
ICTAS II 275	Humidity Controlled Thermogravimetric Analysis and Karl-Fischer Titrator

Polymerization Labs: (Rotating - 3:20 pm – 5:00 pm)

Hahn South 3001	Poly(butylene terephthalate) (Melt Reactor)
Hahn South 3009	Living and Controlled Synthesis of Polystyrene – Anionic Reactor
Hahn South 3009	Intrinsic Viscosity Lab

Wednesday

Characterization Labs: (9:30 am – Noon; 1:00 pm – 1:45 pm; 3:30 pm – 6:00 pm)

Lab Hahn North 307	Thermal and Thermomechanical Analysis (Rotating - 9:30 am - Noon)
Lab Hahn North 307	Melt Rheology (Rotating - 9:30 am - Noon)
ICTAS II 285 & MMDC	Size Exclusion Chromatography and Asymmetric Flow Field Flow Fractionation (1:00 pm – 1:45 pm)
Inn at Virginia Tech	Rheology, Crystallinity and Physical Aging Discussions (3:30 pm - 6:00 pm) Dr. Garth Wilkes

Thursday

Characterization Labs: (10:15 am – 12:15 pm; 1:00 pm – 2:00 pm)

Inn at Virginia Tech	Accelerated Testing (10:15 am – 11:15 am) Mechanical Testing I & II (11:15 am – 12:15 pm; 1:00 pm – 2:00 pm) Dr. Robert Moore and Bruce Orler
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About the Well-Known Faculty

Garth L. Wilkes, Emeritus University Distinguished Professor of Chemical Engineering, Virginia Tech, centers his research on the processing-structure property analysis of polymer systems. Research projects include crystalline polymers, block copolymers, ion containing polymers, irradiation of polymers, sol gel behavior, foams, and elastomers.

Timothy E. Long, Professor of Chemistry, Virginia Tech, is involved with various aspects of chain and step-growth polymerization research including the synthesis and characterization of block, star, branched, and segmented copolymers; liquid crystalline polymers; sol-gel chemistry; living polymerization; electro-active polymers; bio-based monomers and polymers; ionomers and polyelectrolytes; dynamic mechanical analysis and thermal analysis. Previous research experience includes industrial research and development at both Eastman Kodak and Eastman Chemical Company.

Judy S. Riffle, Professor of Chemistry, Virginia Tech, studies the synthesis of functionalized homopolymers and block copolymers and their activity in metal complexation and particle formation and in understanding structure-property relationships in thermoset copolymer networks; expertise also includes ring opening polymerization, biomaterials and siloxanes.

Robert B. Moore, Professor of Chemistry and Associate Director for Research and Scholarship at the Institute for Critical Technology and Applied Science, Virginia Tech, is involved with fundamental research to characterize and understand morphology-physical property relationships in nanostructured polymers. Current efforts include: control of morphology-transport property relationships in PEM fuel cell systems, characterization and control of actuation behavior in ionomer-based artificial muscles, and the correlation of small-angle x-ray and neutron scattering methods with spectroscopy to characterize morphology and dynamics in heterogeneous polymeric systems.

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 Philips 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 Site/Housing Information

Laboratory sessions will be held in the Departments of Chemistry and Chemical Engineering as well as Interdisciplinary Research Institutes on campus.

Lecture sessions in the Drill Field Room at the new Inn at Virginia Tech and Skelton Conference Center, Blacksburg, Virginia, 24061. Telephone: (540) 231-8000.

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 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) which will bring you directly to the Virginia Tech campus.

Payments/Cancellations

All registrations must be prepaid. For fastest service, register online or by fax, providing us with a credit card number. If you are paying by government training form or by check, we shall register you in the course as soon as we receive your check or the faxed hard copy of your training form.

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.

