# Coating Process Fundamentals Short Course

**May 24–26, 2016**

**University of Minnesota College of Continuing Education**

### Last Name  First Name   M.I.

<table>
<thead>
<tr>
<th>Company/Institution</th>
<th>Title /Position</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>E-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Work Address</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>City</th>
<th>State</th>
<th>ZIP Code</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Daytime Telephone</th>
<th>Fax Number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Course Fees
- $1,795 – registration rate (if registered by April 22)
- $1,615 – discounted registration rate for members of IPRIME (if registered by April 22)

- $1,985 – registration rate (if registered after April 22)
- $1,705 – discounted registration rate for members of IPRIME (if registered after April 22)

### Methods of Payment
- Enclosed is a check or money order payable to the University of Minnesota.
- Please charge my UM EFS # ________________

- Please charge my VISA  MasterCard  Discover  American Express

<table>
<thead>
<tr>
<th>Card Number</th>
<th>Expiration Date</th>
<th>Security Code</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Signature of cardholder</th>
<th>Name as it appears on card (please print)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total charge on my credit card is $________

### Online:
- cce.umn.edu/coatingprocess

### Fax to:
- 612-624-5359

### Mail to:
- CCE Registration,
  University of Minnesota
  201 Coffey Hall
  1420 Eckles Avenue
  Saint Paul, MN 55108

If your check is returned because of insufficient funds or closed account, or because you have made a stop payment request, you will be charged a check handling fee of $20. The information on this form is private data, used to identify and locate you, obtain payment, and enable instructors to better know their audience. Name, address, and payment method are mandatory. Information on this form may be shared with instructors and program cosponsors.
Coating Process Fundamentals Short Course – May 24–26, 2016

Course Purpose
This course provides coating engineers and their co-workers with an understanding of the principles of the many processes by which liquid coatings are applied and solidified.

Course Description
To coat is to replace gas at a solid surface by a layer of liquid, then to solidify the liquid by drying, chilling, or curing. Typically the coating must be thin and continuous and, often, uniform and smooth. Usually the final microstructure is important; often it is critical. Coating processes are vital ingredients of modern technology; from organic polymer photoreists in microelectronics and microphotophotonics to inorganic polymer sol-to-gel optical coatings; to magnetic oxide suspensions for tapes and disks; to adhesives and laminates; to ubiquitous paints, enamels, and related protective and decorative coatings; to photoreceptor suspensions for xerography; to multi-layer photographic film, graphic arts products, liquid crystal, and light-emitting displays. Coating itself is fluid mechanics and interfacial phenomena, often delicate.

Drying involves mass and heat transfer, phase equilibria and colloid phenomena. Curing is chemical reaction and more. Drying and curing entail adhesion, shrinkage, stressing, and consequences. Coating processes consist of unit operations that can be understood scientifically. This continually evolving short course is based on research studies and is the first university course to cover coating process fundamentals. Comprehensive course notes are provided.

Intended Audience
The course is designed for engineers who are engaged in coating and who seek a deeper understanding of processes and processing problems. It is also relevant to physical scientists concerned with the formulation of coating liquids for processability and microstructure problems. It is also relevant to physical scientists concerned with the formulation of coating liquids for processability and microstructure problems. Usually the final microstructure is important; often it is critical. It is important. Coating processes are vital ingredients of modern technology; from organic polymer photoreists in microelectronics and microphotophotonics to inorganic polymer sol-to-gel optical coatings; to magnetic oxide suspensions for tapes and disks; to adhesives and laminates; to ubiquitous paints, enamels, and related protective and decorative coatings; to photoreceptor suspensions for xerography; to multi-layer photographic film, graphic arts products, liquid crystal, and light-emitting displays. Coating itself is fluid mechanics and interfacial phenomena, often delicate.

Drying involves mass and heat transfer, phase equilibria and colloid phenomena. Curing is chemical reaction and more. Drying and curing entail adhesion, shrinkage, stressing, and consequences. Coating processes consist of unit operations that can be understood scientifically. This continually evolving short course is based on research studies and is the first university course to cover coating process fundamentals. Comprehensive course notes are provided.

General Information
Registration and Fees
The course fee includes instruction, course materials, lunches, refreshment breaks, and reception. You may register for the course online at cce.umn.edu/coatingprocess or you may fill out the registration form and fax it to the address on the form. A refund, minus a $75 cancellation fee, will be made if a written request is made by April 22, 2016 (another person may attend in your place if you are unable to attend – please notify the course coordinator if this becomes necessary). The University of Minnesota reserves the right to cancel the course if necessary, in which case a full refund will be made.

Location and Accommodations
The short course will be held on the East Bank campus of the University of Minnesota campus. Final meeting room location will be sent to participants before the course. A block of sleeping rooms has been set aside at The Commons Hotel Minneapolis, 615 Washington Avenue S.E., Minneapolis; Phone: 612-379-8888, or 800-922-6757. Reserve your room by April 23 and mention the “Coating Process Fundamentals Short Course” to be placed under the room block.

Continuing Education Units (CEUs)
The Coating Process Fundamentals Short Course is offered for 1.9 CEUs. One CEU is defined as 10 contact hours of participation in an organized continuing education experience under responsible sponsorship, capable leadership, and qualified instruction. Participants who wish to receive CEUs are expected to attend all scheduled sessions of the course.

For Further Information
Maddie Grover, College of Continuing Education Phone: 612-624-4038; Fax: 612-624-6225 E-mail: ccconf5@umn.edu

New this year: laboratory rotations will feature two new, 14’ long roll-to-roll lines.

Enrollment is limited. The course has filled for the past four years. Early registration is encouraged!

Course History
The Coating Process Fundamentals Short Course was developed by L. E. Scriven (1931–2007), Regents Professor, Department of Chemical Engineering and Materials Science, University of Minnesota, and has been taught by Professor Scriven and his colleagues. This 31st offering of the course will be taught by the faculty listed below.

Faculty
Lorraine F. Francis, professor in the Department of Chemical Engineering and Materials Science, co-leads the Coating Process Fundamentals Program (CPFP), and researches drying and microstratification of coatings. Program alumnae: Marcio S. Carvalho, formerly with 3M and Imation, is a professor of Mechanical Engineering at PUC in Rio de Janeiro, and an expert in the area of coating flows. Satish Kumar, professor in the Department of Chemical Engineering and Materials Science, co-leads CPFP, and researches coating flows and interfacial phenomena in coating and printing processes. Wieslaw J. Suszynski heads the Coating Process and Visualization Laboratory at the University. Alon McCormick, professor in the Department of Chemical Engineering and Materials Science, researches nanofluidics and curing processes.

Sponsor Websites
Department of Chemical Engineering and Materials Science
cems.umn.edu
Industrial Partnership for Research in Interfacial and Materials Engineering (IPRIME)
iprime.umn.edu
Coating Process Fundamentals Program
cems.umn.edu/research/cfpf

The University of Minnesota shall provide equal access to and opportunity in its programs, facilities, and employment without regard to race, color, creed, religion, national origin, gender, age, marital status, disability, public assistance status, veteran status, sexual orientation, gender identity, or gender expression. Disability accommodations are available upon request. This brochure is available in alternative formats. Please call 612-624-4838.

Marcio S. Carvalho
Professor Scriven and his colleagues. This 31st offering of the course will be taught by the faculty listed below.

Faculty
Lorraine F. Francis, professor in the Department of Chemical Engineering and Materials Science, co-leads the Coating Process Fundamentals Program (CPFP), and researches drying and microstratification of coatings. Program alumnae: Marcio S. Carvalho, formerly with 3M and Imation, is a professor of Mechanical Engineering at PUC in Rio de Janeiro, and an expert in the area of coating flows. Satish Kumar, professor in the Department of Chemical Engineering and Materials Science, co-leads CPFP, and researches coating flows and interfacial phenomena in coating and printing processes. Wieslaw J. Suszynski heads the Coating Process and Visualization Laboratory at the University. Alon McCormick, professor in the Department of Chemical Engineering and Materials Science, researches nanofluidics and curing processes.

Sponsor Websites
Department of Chemical Engineering and Materials Science
cems.umn.edu
Industrial Partnership for Research in Interfacial and Materials Engineering (IPRIME)
iprime.umn.edu
Coating Process Fundamentals Program
cems.umn.edu/research/cfpf

The University of Minnesota shall provide equal access to and opportunity in its programs, facilities, and employment without regard to race, color, creed, religion, national origin, gender, age, marital status, disability, public assistance status, veteran status, sexual orientation, gender identity, or gender expression. Disability accommodations are available upon request. This brochure is available in alternative formats. Please call 612-624-4838.

Marcio S. Carvalho
Professor Scriven and his colleagues. This 31st offering of the course will be taught by the faculty listed below.

Faculty
Lorraine F. Francis, professor in the Department of Chemical Engineering and Materials Science, co-leads the Coating Process Fundamentals Program (CPFP), and researches drying and microstratification of coatings. Program alumnae: Marcio S. Carvalho, formerly with 3M and Imation, is a professor of Mechanical Engineering at PUC in Rio de Janeiro, and an expert in the area of coating flows. Satish Kumar, professor in the Department of Chemical Engineering and Materials Science, co-leads CPFP, and researches coating flows and interfacial phenomena in coating and printing processes. Wieslaw J. Suszynski heads the Coating Process and Visualization Laboratory at the University. Alon McCormick, professor in the Department of Chemical Engineering and Materials Science, researches nanofluidics and curing processes.

Sponsor Websites
Department of Chemical Engineering and Materials Science
cems.umn.edu
Industrial Partnership for Research in Interfacial and Materials Engineering (IPRIME)
iprime.umn.edu
Coating Process Fundamentals Program
cems.umn.edu/research/cfpf

The University of Minnesota shall provide equal access to and opportunity in its programs, facilities, and employment without regard to race, color, creed, religion, national origin, gender, age, marital status, disability, public assistance status, veteran status, sexual orientation, gender identity, or gender expression. Disability accommodations are available upon request. This brochure is available in alternative formats. Please call 612-624-4838.

Marcio S. Carvalho
Professor Scriven and his colleagues. This 31st offering of the course will be taught by the faculty listed below.

Faculty
Lorraine F. Francis, professor in the Department of Chemical Engineering and Materials Science, co-leads the Coating Process Fundamentals Program (CPFP), and researches drying and microstratification of coatings. Program alumnae: Marcio S. Carvalho, formerly with 3M and Imation, is a professor of Mechanical Engineering at PUC in Rio de Janeiro, and an expert in the area of coating flows. Satish Kumar, professor in the Department of Chemical Engineering and Materials Science, co-leads CPFP, and researches coating flows and interfacial phenomena in coating and printing processes. Wieslaw J. Suszynski heads the Coating Process and Visualization Laboratory at the University. Alon McCormick, professor in the Department of Chemical Engineering and Materials Science, researches nanofluidics and curing processes.

Sponsor Websites
Department of Chemical Engineering and Materials Science
cems.umn.edu
Industrial Partnership for Research in Interfacial and Materials Engineering (IPRIME)
iprime.umn.edu
Coating Process Fundamentals Program
cems.umn.edu/research/cfpf

The University of Minnesota shall provide equal access to and opportunity in its programs, facilities, and employment without regard to race, color, creed, religion, national origin, gender, age, marital status, disability, public assistance status, veteran status, sexual orientation, gender identity, or gender expression. Disability accommodations are available upon request. This brochure is available in alternative formats. Please call 612-624-4838.