# COURSE OFFERING
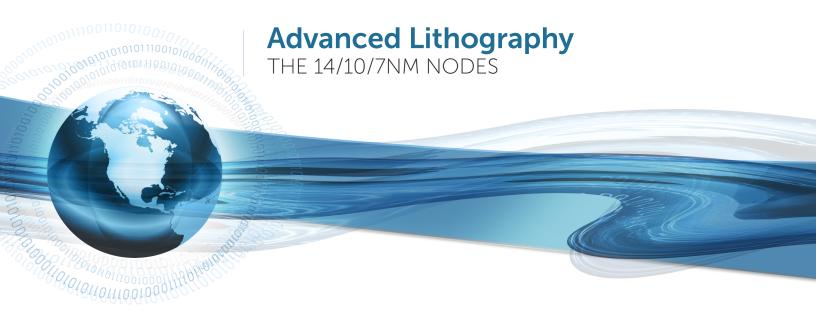
## Advanced Lithography
### THE 14/10/7NM NODES

# Understand the key lithographic challenges required for 3D CMOS fabrication.

**duration:**

One Day

**course brief:**

This one-day course describes the current state-of-the-art as well as the latest advances in lithography for the 14/10/7nm nodes & beyond.



**instructor:**

**Moshe Preil**

For further information contact: 512-576-6404

**Threshold**Systems

**Threshold Systems, Inc.**
**527 Queen Anne Court**

**San Antonio, TX**
**78767**

**www.ThresholdSystems.com**
**512-576-6404**

## course overview:

This course provides a broad, deep treatment of lithography which is the key enabling technology in CMOS IC fabrication. It covers all lithographic technology elements, from basic concepts to leading-edge technology and applications issues for today's most advanced CMOS ICs. The course explains all of the advances enabling 10nm CMOS and beyond, including leading-edge equipment and process evolution, double patterning technologies, computational lithography, Resolution Enhancement Technology (RET), design for manufacturability (DSM) and Extreme Ultra-Violet (EUV) lithography. It also will present a lithography road map describing next-generation lithography technologies.

## appropriate for:

This course is appropriate for professional development of process engineers, applications engineers, device engineers, design engineers, technical marketing engineers and managers as well as process equipment engineers and scientists who wish to improve their understanding of modern lithography.

## course outline:

**Overview of enabling lithographic elements for the 14/10/7nm nodes:**
- Review of key process and equipment concepts
- Deep UV chemically amplified resist technology and applications issues
- Process window latitude trade-offs, line edge roughness (LER), contrast, substrate reflectivity control, etch resistance, resist pattern collapse, process variation

**Resolution Enhancement Technologies (RET):**
- 193nm immersion (193i) lithography equipment performance status
- Sub-wavelength lithography gap & lithography for 14/10/7nm
- RET: customized illumination, optical proximity correction (OPC), sub-resolution assist features (SRAFs), phase shift masks (PSM), & photoresist feature "shrink" techniques
- Design for manufacturability (DFM) techniques to control variation
- Enabling technologies for 10/7nm CMOS
- Computational lithography technology (ILT, SMO, etc.)
- Double and triple patterning lithography (DPL) technologies

**Next generation lithography status and road map:**
- An extensive review of EUV (Extreme Ultra-Violet) 13.5nm wavelength lithography, challenges, issues and status
- Maskless electron beam direct write (EBDW) lithography
- Directed Self-Assembly (DSA) technology

This class is taught by a world-class lithographer and the information in the course is introductory in nature, profusely illustrated, and presented in a clear, technically current and easy-to-understand manner.

**Threshold**Systems

Threshold Systems, Inc.
527 Queen Anne Court

San Antonio, TX
78767

www.ThresholdSystems.com
512-576-6404