

THIN FILM OPTICS · COMPUTATIONAL CHARACTERISATION



NTHRYS

O P C P V T L T D

Thin Film & Optical Coating Analysis Software Track

A computational training catalogue covering ellipsometric data fitting, optical coating design, spectral analysis, defect computer-vision and statistical quality control — delivered entirely on a free, open-source software stack with no instrument required.

41

PROTOCOLS

6

STREAMS

2026

EDITION

Programme Streams at a Glance

This catalogue covers the software and data-analysis portion of NTHRYS thin-film and optical-coating training, organised into 6 streams. Every protocol carries a unique code, a defined duration in hours and a per-protocol fee. All work is performed hands-on at a workstation using open-source tools, so trainees can keep practising after the programme at zero licensing cost. Streams combine into custom tracks for students, R&D staff and QC teams.

STREAM CODE	STREAM	FOCUS	PROTOCOLS	HOURS
NTS-EL	Ellipsometry Modeling & Data Fitting	Optical models, dispersion relations and reverse engineering of multilayer stacks	8	55
NTS-OD	Optical Coating & AR Filter Design	Transfer-matrix design and optimisation of anti-reflection and interference coatings	8	55
NTS-SA	Spectral & Reflectance Data Analysis	Interpreting %R/%T spectra, extracting thickness and correlating to design	7	40
NTS-DV	Defect Imaging & Computer Vision	Automated detection, counting and classification of coating defects from images	7	40
NTS-QC	Statistical Process Control & QC Analytics	Control charts, capability indices and yield analytics for coating production	7	42
NTS-WF	Reproducible Workflows & Reporting	Environment setup, notebooks, figure craft and automation for analysis pipelines	4	21
Total protocols & training hours			41	253

MODE

Online (live) or Offline at NTHRYS, Hyderabad

PRACTICAL

Hands-on, workstation-based on real datasets

CERTIFICATE

NTHRYS certificate on successful completion

SOFTWARE

100% open-source – no licence required

HOW TO READ A CODE

NTS – EL – 01

NTS – Nthrys Thin-film Software track

EL – Stream code (e.g. Ellipsometry)

01 – Protocol number within the stream

Ellipsometry Modeling & Data Fitting

Optical models, dispersion relations and reverse engineering of multilayer stacks

OPEN-SOURCE STACK pyElli · refellips · regress-pro · tmm · Imfit

CODE	PROTOCOL	DESCRIPTION	DURATION	FEE (INR)
NTS-EL-01	Ellipsometry Data Fundamentals (Ψ, Δ)	Reading psi/delta spectra, Jones & Mueller matrix basics and data import.	5 hrs	₹ 3,500
NTS-EL-02	Transparent-Film Dispersion Models	Cauchy and Sellmeier modeling of dielectric and polymer layers.	6 hrs	₹ 4,500
NTS-EL-03	Absorbing-Film Oscillator Models	Lorentz, Tauc-Lorentz and Drude models for metals and semiconductors.	7 hrs	₹ 5,500
NTS-EL-04	Surface Roughness & EMA Layers	Bruggeman effective-medium and void-fraction modeling of rough surfaces.	6 hrs	₹ 4,500
NTS-EL-05	Single-Layer Fitting & MSE Minimisation	Full regression workflow and goodness-of-fit in pyElli/refellips.	7 hrs	₹ 5,500
NTS-EL-06	Multilayer Stack Reverse Engineering	Building and fitting unknown multilayer stacks from measured data.	9 hrs	₹ 7,500
NTS-EL-07	Graded & Inhomogeneous Layers	Index gradients and depth-profile modeling of non-uniform films.	8 hrs	₹ 6,500
NTS-EL-08	Fit Uniqueness & Parameter Correlation	Error bars, correlation matrices and avoiding over-fitting.	7 hrs	₹ 6,000

Optical Coating & AR Filter Design

Transfer-matrix design and optimisation of anti-reflection and interference coatings

OPEN-SOURCE STACK OpenFilters · tmm · Python (numpy/scipy)

CODE	PROTOCOL	DESCRIPTION	DURATION	FEE (INR)
NTS-OD-01	Transfer-Matrix Method Fundamentals	Computing reflectance, transmittance and phase for arbitrary stacks.	5 hrs	₹ 3,500
NTS-OD-02	Quarter-Wave Single-Layer AR Design	MgF2-on-glass anti-reflection coating at normal incidence.	5 hrs	₹ 3,500
NTS-OD-03	Two- & Three-Layer AR Coatings	V-coat and short-band anti-reflection coating design.	7 hrs	₹ 5,500
NTS-OD-04	Broadband Multilayer AR Optimisation	Target-driven refinement of broadband AR stacks in OpenFilters.	8 hrs	₹ 6,500
NTS-OD-05	High-Reflector / DBR Stack Design	Quarter-wave Bragg mirror and distributed-reflector synthesis.	7 hrs	₹ 5,500
NTS-OD-06	Bandpass & Edge Filter Synthesis	Notch, long-pass and short-pass interference filter design.	8 hrs	₹ 6,500
NTS-OD-07	Needle & Gradient Optimisation	Automated layer-insertion and refinement design methods.	9 hrs	₹ 7,500
NTS-OD-08	Angle & Polarisation Dependence	Off-axis performance and s/p polarisation splitting analysis.	6 hrs	₹ 4,500

Spectral & Reflectance Data Analysis

Interpreting %R/%T spectra, extracting thickness and correlating to design

OPEN-SOURCE STACK Python (pandas/scipy/matplotlib) · tmm · OpenFilters

CODE	PROTOCOL	DESCRIPTION	DURATION	FEE (INR)
NTS-SA-01	Spectral Data Import & Preprocessing	File formats, baseline correction and smoothing of raw spectra.	4 hrs	₹ 2,500
NTS-SA-02	Reflectance & Transmittance Interpretation	Reading %R/%T curves and interference-fringe features.	5 hrs	₹ 3,500
NTS-SA-03	Thickness from Interference Fringes	Fringe-counting and FFT methods for film-thickness extraction.	6 hrs	₹ 4,500
NTS-SA-04	Reverse-Fitting n,k from Reflectance	Optical-constant extraction from spectrophotometric data.	8 hrs	₹ 6,500
NTS-SA-05	Design-vs-Measurement Correlation	Residual analysis and diagnosis of coating deviations.	6 hrs	₹ 4,500
NTS-SA-06	CIE Colour & Photometric Computation	Colour coordinates and luminous values of coatings from spectra.	6 hrs	₹ 4,500
NTS-SA-07	Haze, Scatter & Transmittance Metrics	Quantifying optical quality and clarity from measured data.	5 hrs	₹ 3,500

Defect Imaging & Computer Vision

Automated detection, counting and classification of coating defects from images

OPEN-SOURCE STACK ImageJ / Fiji · OpenCV · scikit-image

CODE	PROTOCOL	DESCRIPTION	DURATION	FEE (INR)
NTS-DV-01	Image Import, Calibration & Scaling	Fiji setup and pixel-to-micron spatial calibration.	4 hrs	₹ 2,500
NTS-DV-02	Thresholding & Defect Segmentation	Isolating defects from background by intensity and morphology.	5 hrs	₹ 3,500
NTS-DV-03	Pinhole & Particle Counting	Size distribution and defect-density statistics.	6 hrs	₹ 4,500
NTS-DV-04	Scratch & Line-Defect Detection	Edge and Hough-transform detection of linear defects.	6 hrs	₹ 4,500
NTS-DV-05	Automated Defect Classification	Feature extraction and basic ML with scikit-image / sklearn.	8 hrs	₹ 6,500
NTS-DV-06	Batch Processing & Macro Automation	ImageJ macros and Python pipelines for high-throughput QC.	6 hrs	₹ 4,500
NTS-DV-07	Coating Uniformity Mapping from Images	Spatial heatmaps of thickness and defect distribution.	5 hrs	₹ 3,500

CATEGORY · NTS-QC

Statistical Process Control & QC Analytics

Control charts, capability indices and yield analytics for coating production

OPEN-SOURCE STACK Python (pandas/scipy/statsmodels) · R · JASP

CODE	PROTOCOL	DESCRIPTION	DURATION	FEE (INR)
NTS-QC-01	QC Data Structures & Logging	Designing measurement logs and structured QC databases.	4 hrs	₹ 2,500
NTS-QC-02	Control Charts (X-bar, R, I-MR)	Building SPC charts for coating production runs.	6 hrs	₹ 4,500
NTS-QC-03	Process Capability (Cp, Cpk)	Thickness and uniformity capability-index computation.	6 hrs	₹ 4,500
NTS-QC-04	Wafer / Substrate Uniformity Maps	Contour and wafer-map visualisation of across-batch variation.	6 hrs	₹ 4,500
NTS-QC-05	Gauge R&R / Measurement-System Analysis	Repeatability and reproducibility of the measurement chain.	7 hrs	₹ 5,500
NTS-QC-06	Yield & Defect-Density Trend Analytics	Pareto, trend and SPC-alarm analysis of production yield.	6 hrs	₹ 4,500
NTS-QC-07	Automated QC Report Generation	Programmatic PDF/Excel quality reports from datasets.	7 hrs	₹ 5,500

CATEGORY · NTS-WF

Reproducible Workflows & Reporting

Environment setup, notebooks, figure craft and automation for analysis pipelines

OPEN-SOURCE STACK Python · Jupyter · matplotlib · Git

CODE	PROTOCOL	DESCRIPTION	DURATION	FEE (INR)
NTS-WF-01	Python Optics Environment Setup	Installing numpy/scipy/matplotlib/tmm/OpenFilters cleanly.	4 hrs	₹ 2,500
NTS-WF-02	Jupyter Notebooks for Reproducible Analysis	Documenting and re-running analysis workflows end-to-end.	5 hrs	₹ 3,500
NTS-WF-03	Publication-Quality Figure Generation	matplotlib styling for spectra, maps and multi-panel plots.	6 hrs	₹ 4,500
NTS-WF-04	Data Pipeline Automation & Version Control	Scripting and Git for reproducible QC datasets.	6 hrs	₹ 4,500

ENROL · ANALYSE · CERTIFY

Build Computational Skills in Thin-Film Optics

Every protocol is delivered as hands-on training on a free, open-source software stack — covering optical theory, data fitting, coating design, computer-vision defect analysis and statistical quality control. Protocols combine into custom tracks aligned to individual or institutional goals, online or on-site at Hyderabad.

41 training protocols across **6** streams

253 total training hours

100% open-source — pyElli, refellips, OpenFilters, tmm, Fiji, OpenCV, Python, R

NTHRYS certificate · unique product code for every protocol

FULL-TRACK INVESTMENT

₹ 1,65,000

Individual protocols total ₹ 1,92,000 · bundled full-track price shown

NTHRYS OPC PVT LTD

THIN FILM & OPTICAL COATING TRAINING · HYDERABAD