Rules and procedures for the use of the equipment ULTRA-HIGH-PERFORMANCE LIQUID CHROMATOGRAPHY SYSTEM COUPLED TO A PHOTODIODE ARRAY DETECTOR acquired under the MUR Department of Excellence Project 2023–2027

ACADEMIC CONTACT
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Approved by the Department of Excellence Steering Committee on 3 September 2026

Approved by the Council of the Department of Food and Drug on 9 September 2026

Description of the equipment

The system installed in the laboratory is a Shimadzu Nexera LC-40 XR series ultra-high-performance liquid chromatograph (UHPLC). This advanced configuration is designed to deliver high-resolution chromatographic separations, maximum reproducibility of retention times and extremely rapid analysis, while drastically reducing solvent consumption compared with conventional SFC/HPLC.

Main modules and accessories comprising the equipment:

- **Solvent Delivery Module (Pump) – LC-40D XR: A high-pressure binary/quaternary pump capable of operating under UHPLC conditions, with extended "XR" pressure limits suitable for columns packed with sub-2 µm particles. It provides a constant flow and accurate micromixing, even with complex elution gradients.**
- **Degassing Unit – DGU-405: An integrated membrane system for the continuous removal of dissolved gases from mobile-phase solvents, essential for preventing air bubbles in the system and ensuring baseline stability.**
- **High-Speed Autosampler – SIL-40C XR: An automated injection system featuring an extremely short cycle time and virtually zero carry-over (cross-contamination), thanks to advanced surface treatments of the injection needle. It supports temperature-controlled multi-position plates to maintain sample stability.**
- **Column Oven – CTO-40S: A high-precision, temperature-controlled vertical module for housing chromatographic columns. Strict temperature control, including at high temperatures, enables optimisation of selectivity, reduction of mobile-phase viscosity and standardisation of retention times.**
- **Photodiode Array Detector (PDA) – SPD-M40: An advanced, highly sensitive photometric detector with a temperature-controlled flow cell. It enables simultaneous acquisition of UV-visible spectra over the 190–800 nm range in three dimensions (time, intensity and wavelength). It is ideal for assessing peak purity, identifying analytes using spectral libraries and simultaneously quantifying compounds with different absorption maxima (λmax).**

Main applications

The system is certified for qualitative analysis (fingerprinting and purity profiling) and quantitative analysis of complex mixtures in various research fields, including pharmaceutical and toxicological chemistry (active ingredient assays and impurities), agri-food research (polyphenols, vitamins, amino acids and contaminants), synthetic organic chemistry (kinetic monitoring and reaction screening), and environmental analysis.

Authorised permanent staff and trainers

Surname	First name	Dept./Centre	Contact
Costantino	Gabriele	Food and Drug	gabriele.costantino@unipr.it
Biagi	Marco	Food and Drug	marco.biagi@unipr.it
Annunziato	Giannamaria	Food and Drug	giannamaria.annunziato@unipr.it
De Paolis	Marco	Food and Drug	marco.depaolis@unipr.it

The list of authorised personnel is kept up to date and is available in Annex 2 to these Rules.

Access to and use of the equipment

1) Research groups in the ALIFAR Department with authorised users may access the equipment through their own staff, subject to prior booking on the dedicated Teams platform managed by the Technical Contact. Groups without a designated contact may contact the staff listed above. Access remains subject to booking on the Teams platform. Use of the equipment without a booking will result in a charge for a full working day, equivalent to eight hours. Only personnel who have completed the initial training (authorised personnel and trainers), or who have subsequently been trained by the trainers, may use the equipment.
2) Users from other University departments and external users may contact the Scientific Coordinator by completing the analysis request form (Annex 1).

Fees

Three user categories apply for the purpose of equipment usage fees:

1) ALIFAR Users: teaching and research staff of the University of Parma affiliated with the ALIFAR Department;
2) Internal Users: teaching and research staff of the University of Parma;
3) External Users: researchers and other staff from universities, research bodies and public and private institutions.

Type of analysis	**ALIFAR USER €/sample in triplicate***	**NON-ALIFAR INTERNAL USER €/sample in triplicate***	**EXTERNAL USER €/sample in triplicate***
Standard quantitative analysis for internal batches/samples (established method)	1.0	6	40
Method set-up / development	1.0	6	550
Qualitative profiling / fingerprinting (chromatogram + PDA spectra)	1.0	6	100
High-throughput screening (high-throughput/overnight)	1.0	6	410

ALIFAR users who contribute their own research funds towards annual preventive maintenance contracts and/or comprehensive insurance, or towards repair costs, will not be charged usage fees until the amount contributed has been offset.

Annex 1. ULTRA-HIGH-PERFORMANCE LIQUID CHROMATOGRAPHY SYSTEM COUPLED TO A PHOTODIODE ARRAY DETECTOR – ANALYSIS REQUEST FORM

To be emailed to the authorised personnel

Applicant details

UNIVERSITY OF PARMA INTERNAL USER
Dept./Centre:
Applicant:
User:
E-mail:
Telephone:

EXTERNAL USER
Organisation name:
VAT no./Tax code
Address:
Applicant:
User:
E-mail:
Telephone:

Sample information and type of analysis

Number of samples to be analysed (including blanks)	*E.g. "5 plant extracts + 1 mobile-phase blank + 3 calibration standards, all in duplicate = 18 samples in total"*
Sample type (briefly describe, specifying the matrix)	*E.g. "Methanolic extracts of leaves from plant X", "Purified organic synthesis products", "Liquid/solid pharmaceutical formulations"*
Matrix clean-up	☐ YES ☐ NO **Clean-up technique used (required to protect the column): e.g. centrifugation, filtration through 0.22/0.45 µm filters, solid-phase extraction (SPE), protein precipitation...**
Sample conditions	*E.g. "Dissolved in acetonitrile/water 50:50, pH 4.5, no suspended particulate matter, thermally stable at 4°C"*
Requested analysis mode	☐ Standard quantitative analysis (established method) ☐ New method development / optimisation ☐ Qualitative profiling / 3D PDA spectra (fingerprinting) ☐ High-throughput screening
Spectrophotometric properties of the analyte	*(if known)* *Specify the known wavelength of maximum absorption (λmax) or the UV-Vis range of interest (e.g. 254 nm, 280 nm or a spectral range of 190–400 nm).*
Hazards	☐ flammable ☐ irritant ☐ acute toxicity ☐ harmful ☐ corrosive ☐ oxidising ☐ carcinogenic/mutagenic ☐ hazardous to the environment ☐ no known hazards

Bookings may be cancelled up to the third working day before the requested date.

If the equipment is not used and the booking has not been cancelled in time, payment for the service is still required.

Date …….

Applicant's signature (research fund holder)

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Annex 2. List of personnel authorised to use the equipment

Permanent staff and trainers			
Surname	**First name**	**Dept./Centre**	**Contact**
Costantino	Gabriele	Food and Drug	gabriele.costantino@unipr.it
Biagi	Marco	Food and Drug	marco.biagi@unipr.it
Annunziato	Giannamaria	Food and Drug	giannamaria.annunziato@unipr.it
De Paolis	Marco	Food and Drug	marco.depaolis@unipr.it
Authorised permanent staff			
Surname	**First name**	**Dept./Centre**	**Contact**
Authorised users			
Surname	**First name**	**Dept./Centre**	**Contact**