Rules and procedures for use of the instrument HIGH-PERFORMANCE LIQUID CHROMATOGRAPHY SYSTEM FOR PREPARATIVE APPLICATIONS COUPLED WITH A UV/VIS DETECTOR purchased under the MUR Department of Excellence Project 2023–2027

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Approved by the Council of the Department of Food and Drug on 09/09/2026

Instrument description

The Preparative High-Performance Liquid Chromatography system (preparative HPLC-UV; Nexera Prep model), supplied by Shimadzu Italia S.r.l., is a state-of-the-art instrument platform designed for efficient separation, fractionation and purification of complex mixtures on a preparative scale.
Compared with conventional analytical systems, Nexera Prep technology offers the following operational advantages:

High loading capacity and optimised flow: Supports high flow rates and injection volumes suited to isolating substantial amounts of purified product, drastically reducing overall purification times.

Flexible chromatographic configuration: The integrated column organiser enables rapid switching between different stationary phases, optimising the screening of
separation conditions for different chemical classes.

Broad-spectrum UV-Vis detection and high linearity: The variable-wavelength detector covers the entire UV-Vis spectrum, ensuring accurate identification of both standard chromophores and weakly absorbing molecules.
Gradient stability and reproducibility: The precision binary pump ensures accurate mobile-phase composition even at high flow rates, maintaining consistent retention times during repeated fractionation cycles.

Main applications

Chemical synthesis (organic and inorganic): Separation, isolation and purification of intermediates and final products from synthetic reactions.

Fractionation of crude reaction mixtures: Clean-up and isolation of by-products, isomers or impurities from complex post-reaction mixtures.

Medicinal and nutraceutical chemistry: Fractionation and isolation of active ingredients, metabolites or compounds of biological interest extracted from natural or biological matrices.

Main instrument modules and accessories:

The Shimadzu Nexera Prep system is an integrated platform combining precision high-pressure hardware and advanced control software.
The instrument comprises four main modules:
1. The pumping unit (preparative binary pump)
This is the main fluid delivery unit of the chromatographic system. It includes:
● High-precision pumping system with a flow capacity of up to 50 mL/min.
● Capillary kit specifically optimised for operating flow rates of 15–40 mL/min,
ideal for medium and large preparative columns.
2. The injection and column housing module
Enables accurate sample introduction and stationary-phase management:

● Manual preparative injector: Robust and designed to withstand continuous high-pressure loading cycles.
● 5 mL steel loop: Enables injection of large volumes of crude reaction mixture without saturation or pressure drops.
● Column organiser: A structured housing to protect, connect and select the chromatography columns in use.
3. The detection system (UV/VIS detector)
The module responsible for identifying chromatographic peaks eluting from the column:
● Variable-wavelength UV detector operating over the 190–700 nm spectral range.
● Dedicated preparative flow cell, engineered to maintain signal linearity and withstand continuous flow rates of up to 50 mL/min without peak dispersion.
4. The control workstation and software (LabSolution)
The software package installed on a dedicated PC manages the entire analytical and preparative workflow:
● Guided programming of elution gradients, flow parameters and peak-cutting/collection criteria.
● Processing and storage of chromatographic data, with advanced tools for calculating purity and fractionation yield.

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 staff is kept up to date and is available in **Annex 2** to these Rules.

Instrument access and use

1) ALIFAR Department research groups with authorised users may access the instrument 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 relevant staff. Access remains subject to booking on the Teams platform. Use of the instrument without a booking will result in a charge for a full working day of eight hours. Use is restricted to staff who have completed the initial training (authorised staff and trainers) or have subsequently been trained by the trainers.
2) Users from other University departments and external users may contact the Scientific Supervisor by completing the analysis request form (**Annex 1**).

Fees

Three user categories apply to instrument usage fees:

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

Type of analysis	**ALIFAR USER** **€/sample in triplicate***	**INTERNAL NON-ALIFAR USER** **€/sample in triplicate***	**EXTERNAL USER** **€/sample in triplicate***
1. Standard fractionation / organic purification – single run (for individual samples)	3	11	50
2. Standard fractionation / organic purification – half day	3	11	180
3. Standard fractionation / organic purification – full day	3	11	350
4. Complex purification / natural and nutraceutical extracts	3	11	180
5. Method development & scale-up (one-off service for complex matrices)	3	11	220

Application notes and consumables charging criteria

Internal users (ALIFAR and non-ALIFAR): Charges are based solely on the actual hours the system is occupied (column equilibration, chromatographic run and final system washes). HPLC/preparative-grade solvents and specific columns are not included in the hourly rate and are charged separately at cost or supplied directly by the user.

External users (all-inclusive package rate): External users are charged a package rate for each individual sample isolated. The final price includes the doubled instrument hourly rate and the technician's rate, multiplied by the estimated average hours required for the specific protocol, as well as column depreciation and the use of standard solvents.

ALIFAR users who use their research funds to contribute to annual preventive maintenance and/or insurance contracts (*all risks*) or to pay for repairs will not be charged until their contribution has been offset in full.

Annex 1. HIGH-PERFORMANCE LIQUID CHROMATOGRAPHY SYSTEM FOR PREPARATIVE APPLICATIONS COUPLED WITH A UV/VIS DETECTOR – ANALYSIS REQUEST FORM

to be emailed to authorised staff

Applicant details

INTERNAL USER AT THE UNIVERSITY OF PARMA
Dept./Centre:
Applicant:
Instrument user:
E-mail:
Telephone:

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

Information on samples and type of analysis

Analysis objective	☐ Main peak isolation, ☐ Crude mixture fractionation, ☐ Enantiomeric / isomer purification
Number of samples / crude mixtures to load	
Estimated total sample mass (mg/g)	
Solubility verified in	☐ Methanol, ☐ Acetonitrile, ☐ Water, ☐ DMSO, ☐ Other: _____
Estimated maximum dissolution volume	
Sample thermal and chemical stability	☐ Stable at room temperature, ☐ Light-sensitive, ☐ Thermolabile (requires 4 °C)
Known absorption wavelength (nm)	UV maximum: _____ nm
Known initial analytical conditions (if available)	Analytical column used: _____ Gradients/mobile phases: _____
Particulates present / filtration performed	☐ YES (0.45 µm filter), ☐ NO (requires filtration before injection)
Sample hazards	☐ Flammable, ☐ Irritant, ☐ Toxic, ☐ Corrosive, ☐ Hazardous to the environment, ☐ No known hazards

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

If the booking is not cancelled in time, the service will be charged even if it is not used.

Date ……. Applicant's signature (fund holder)

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Annex 2. Staff authorised to use the instrument

Permanent staff and trainers			
Surname	**First name**	**Dept./Centre**	**Contact**
Costantino	Gabriele	Food and Drug	gabriele.costantino@unipr.it
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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**
Bugatti	Kelly	Food and Drug	kelly.bugatti@unipr.it
Instrument users			