

BIA Core Facility User Guide

The BIA Core Facility provides specialized applications and support in Surface Plasmon Resonance (SPR) biomolecular interaction analysis to basic and clinical researchers within the Duke Community. Presently, the BIA Core offers two usage models for completion of SPR analyses.

- **Independent Use:** Researchers will be trained in the independent operation of the Biacore T200 SPR platform. Once trained and approved for use, researchers will be free to reserve and operate the instrument independently with 24/7/365 availability.
- **Sample Submission:** Researchers provide the samples of interest and all experimentation and analysis will be performed by the Core Staff (Available platforms: Biacore 3000, S200, and T200 (SPR) and ForteBio OctetRed96 (BLI)). Only projects where there is a genuine collaboration with the Facility Director Munir Alam will be able to utilize the Sample Submission usage model. Please contact the BIA Core Facility Manager to discuss availability.

The BIA Core Facility will be using the CoreResearch@Duke Shared Resource management system (<https://medschool.duke.edu/research/core-research-facilities>) for integrated service request, instrument reservation, and billing services. All work performed on these instruments must be requested and billed through the CR@Duke system. Please follow the steps below to establish a user account, submit samples, reserve instrument time, and complete an experiment.

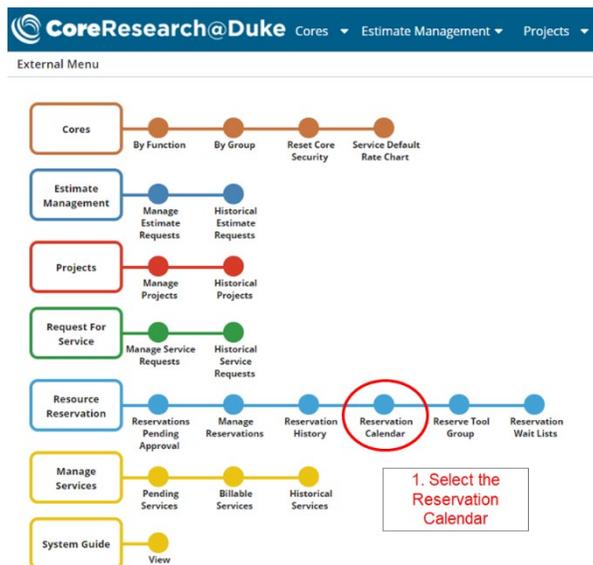
For first-time users, contact the BIA Core Facility Manager (Ken Cronin, kdcronin@duke.edu) to schedule an initial consultation to discuss the details of the project. At this meeting, it can be determined which usage model, SPR platform, and experimental approach will be most appropriate to achieve the desired project outcomes. If interested in utilizing only the Sample Submission model, arrangements can be made at this time for the desired experimental plan and timeframe.

Independent Use – T200 Training

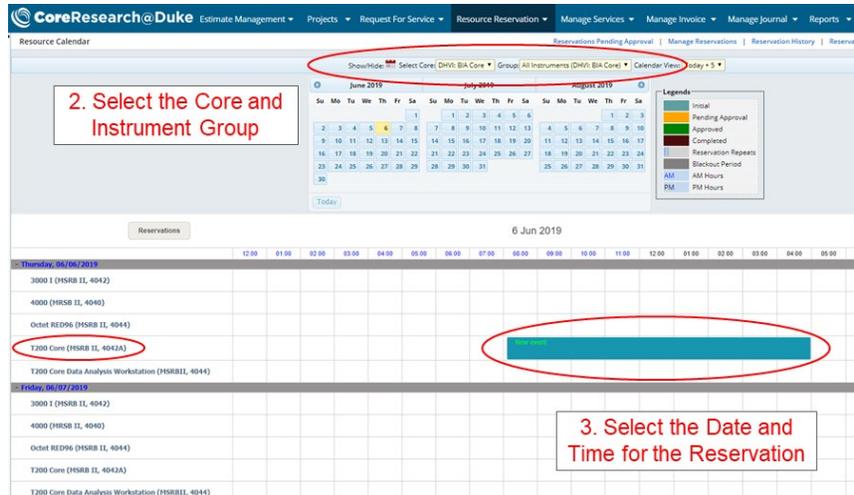
1. **Schedule a T200 training session** with the BIA Core Facility Manager, which will take approximately 1 day (6-7 hours).
 - All materials for the training session will be included in the cost of the training, including the training kit, materials, and the Series S CM5 Sensor Chip (GE Healthcare Catalog #BR100530).
 - At this time, users should work with their **PI and/or PI Delegate to login to the CR@Duke system and link the user's NetID to the PI's account and the appropriate fund codes.** Information on completing these steps is located on the CR@Duke Informational Page in the training guide titled "How to Add a Facility User and Link to a Project" (<https://medschool.duke.edu/research/shared-resources/coreresearchduke-informational-site>).
2. Upon completion of the training session, users will be ready to begin **supervised experiments.** Users will need to **correspond with the BIA Core Facility Manager via email** to schedule the first few sessions until the user feels comfortable operating the instrument independently.
3. Once a user is approved for **independent use**, they are free to reserve the instrument through CoreResearch@Duke and operate either with or without supervision, as desired. The BIA Core Facility Manager will continue to be available for consultation and instrument issues, as needed.
 - **Disclaimer:** For researchers utilizing the Independent Use model, the BIA Core Facility Manager and Staff will be available during and after the supervisory period to provide technical advice and consultation regarding the design, completion, and analysis of SPR experiments. However, the interpretation of obtained results in the context of the specific project and the decision-making regarding the experimental direction of the project are the sole responsibility of the researcher.

Independent Use – Making a Reservation

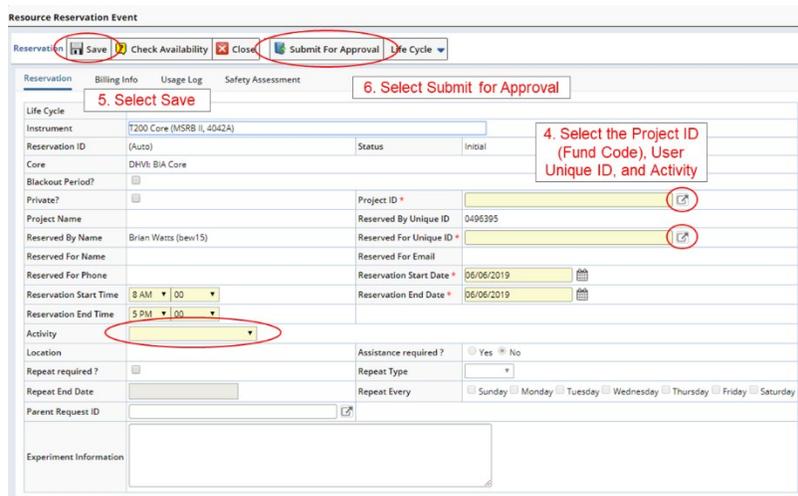
- **Login** to the system using your NetID. You may not be able to access the system, and you WILL NOT be able to reserve instrument time if you are not linked to the appropriate PI and fund code (see above).
- 1. On the main page locate and select the **Reservation Calendar** tram stop from the **Resource Reservation** tram line.



2. From the drop down menus, select the core: **DHVI: BIA Core**, and select the instrument group: **All Instruments (DHVI: BIA Core)**.
 - The only instrument available for reservation by independent users will be the **T200 Core (MSRB II, 4044A)**.
3. To make an instrument reservation, **select the desired date and time** and drag the cursor to highlight the selection.
 - Due to the complex nature of SPR and the potential for unexpectedly time-consuming processes, e.g. immobilization optimization, regeneration condition scouting, ligand instability, etc., the minimum instrument reservation is **8 hours** and can be increased in **4 hour increments** to a **maximum allowable reservation of 72 hours**.
 - If a user is starting an experiment and will be leaving the experimental sensor chip in the instrument overnight (whether actively running a method or leaving the instrument on standby), the reservation needs to be made to include **the entire time the instrument will be occupied**. The instrument is considered **occupied** from the initial docking of the experimental sensor chip until the chip is undocked and the mandatory Desorb cleaning procedure is completed. The actual instrument usage time will be recorded by the user and can be modified after the fact for billing purposes.
 - Users will be charged the full current usage rate for the hours of actual instrument usage and may be charged a percentage (5-15%) of the current usage rate for inactive/standby time in a reservation at the discretion of the BIA Core Facility Manager should multiple instances of underutilization be observed.



2. Select the Core and Instrument Group
3. Select the Date and Time for the Reservation
4. On the Resource Reservation Event screen, the user must select the appropriate **Project ID** (Fund Code), **Unique ID**, and the **Independent Use Activity**. The user may also adjust the **Reservation Start and End Time** if necessary and input any identifying **Experimental Information**.
 - The Operator Assisted (**OpAsst**) Activities are intended for use by the Core Staff as part of the Sample Submission Model or if extensive supervision by Core Staff is required outside of the initial supervisory period. In this case, the Core Manager must be notified of the experimental schedule to ensure availability prior to reservation.



5. **Verify that the reservation information** is correct and select **Save** at which point the system will verify that the time you selected is available and that you are certified to reserve the selected instrument.
6. Once the reservation is saved, the user **MUST** select **Submit for Approval** to confirm the reservation. Failing to complete this step will result in the reservation disappearing from the calendar after 5 minutes. Once submitted, the reservation will appear on the calendar in **orange** indicating it is **Pending Approval** and will turn **green** once it is **Approved** by the Core Manager. The reservation can be **modified or cancelled** by double clicking the reservation in the calendar window.

Independent Use – Starting an Experiment

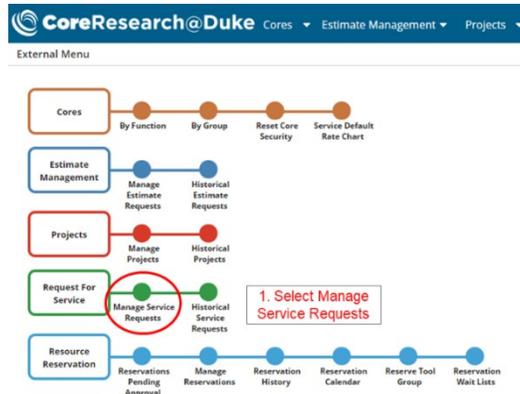
1. At the start of the experimental reservation, the user must sign-in on the **T200 Core Independent Use Log Sheet** indicating the date, user's name, a contact number, and the experiment start and end times for each day the instrument is reserved. After completing the reservation, the user should indicate on the sheet **the total number of instrument usage hours**, i.e. the time the instrument was operating and not running in standby mode.
2. When arriving at the instrument, the instrument should be running on standby mode with a maintenance chip docked. **To undock the Maintenance Sensor Chip** and replace it with your experimental chip, select **Stop Standby** (Tools -> Stop Standby) followed by **Eject Chip** (Tools -> Eject Chip). Remove the maintenance chip and store it in the appropriate 50 mL conical tube in the refrigerator beneath the instrument.
3. While standby is stopped, **replace the Milli-Q H₂O on the left-hand tray ONLY with filtered (0.22 µm) running buffer**. The Milli-Q H₂O on the right-hand tray should NEVER be replaced with running buffer.
4. **Insert the Experimental Chip** with the arrows pointing into the machine and **manually close the sensor chip port**. In the T200 Control Software, if docking a new sensor chip, input the chip type (CM5, SA, L1, etc.), the desired chip ID (including at least the user's initials and the date), and the batch number (optional) and select **Dock Chip**.
 - If it is not a new sensor chip, choose **Reuse Chip** and select the stored chip ID from the drop-down list.
5. Once the experimental chip is docked, it is important to run a **Prime** procedure to flush the flow system with running buffer. Navigate to Tools -> Prime and select Start.
6. Once the Prime procedure is complete, run the **Normalize** procedure, which adjusts the detector signal to compensate for slight variations between individual sensor chips, using the provided BIA normalizing solution (70% glycerol) located in the door of the refrigerator next to the instrument (store at 4 °C). Navigate to Tools -> More Tools -> Normalize, then select Start and follow the on-screen prompts.
 - On the **Rack Positions** screen, use the drop-down menu on the top left to select the appropriate sample rack layout (typically Sample and Reagent Rack 1) and use positions for the 0.8 mL tubes (rows A-C) to load the required minimum volume (120 µL) of the BIA normalizing solution.
 - If reusing a chip, it is not necessary, and not recommended, to complete the Normalization a second time.

Independent Use – Completing an Experiment

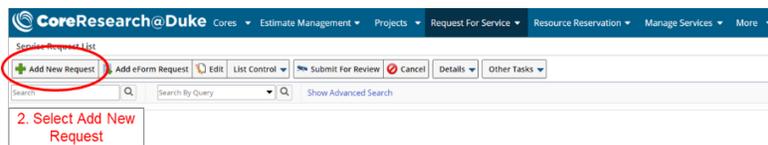
1. Once a set of experiments has been completed and the user is ready to undock the experimental sensor chip and prepare the instrument for the next user, **Standby should be stopped** (Tools -> Stop Standby) and the experimental sensor chip should be **undocked** (Tools -> Eject Chip).
2. While standby is stopped, the running buffer should be **replaced with filtered Milli-Q H₂O** (wipe down the buffer tubing to remove residual buffer/salts before inserting into the Milli-Q H₂O).
3. Replace the experimental chip with the **Maintenance Sensor Chip** and manually close the sensor chip port. In the T200 Control Software, select New Chip and input the chip type as Maintenance. There is no need to alter the chip name or the batch number. Select **Dock Chip** to dock the sensor chip.
4. Once the Maintenance chip is docked, run the **Prime** procedure (Tools -> Prime).
5. Once the Prime procedure is complete, run the **Desorb** procedure to clean the instrument in preparation for a new user. Navigate to Tools -> More Tools -> Desorb, then select Start and follow the on-screen prompts.
 - On the **Rack Positions** screen, use the drop-down menu on the top left to select the appropriate sample rack layout (typically Sample and Reagent Rack 1) and use positions for the 1.5 mL tubes (rows D-E) to load the required minimum volumes (1270 µL) for each BIA desorb solution.
 - BIA desorb solution 1 is stored at RT on the shelf next to the instrument and BIA desorb solution 2 is stored at 4 °C in the door of the refrigerator beneath the instrument.
 - The completion of the Desorb procedure marks **the end of a user's experimental reservation**.
6. **Record the total instrument usage time** (estimated non-standby time) on the T200 Core Independent Use Log Sheet and **inform the Core Manager of any adjustments that need to be made to the billable instrument usage time**.
 - When a method or procedure is completed, the T200 will automatically switch to Standby Mode. The BIA Core Facility generally does not charge users for extended (overnight) periods of instrument standby during the reservation window. However, it will be **the responsibility of the user to inform the Core Manager of the actual instrument usage time after completion of the reservation**. If the user does not complete this step, the fund code will be charged for the entirety of the reserved time.
 - If a user repeatedly violates this policy, by not appropriately utilizing the reserved time, the Core Manager reserves the right to charge the user's fund code for a percentage of the unused time.
7. SPR raw data files (.blr) and analyzed evaluation files (.bme) will be stored locally on the hard drive of the instrument control computer (C:\BIA Users) in the user's designated folder for as long as space is available and should not be deleted from the local hard drive by the user. While all T200 Core SPR data will be backed up periodically to the DHVI's N: Drive (N:\Investigators\Alam\Laboratory\B-T200 Core Backup), **Independent Users are encouraged to create personal backups of any raw data or analyzed data**.

Sample Submission – Creating a Service Request

- All sample submissions to the BIA Core Facility will require a **Service Request on CoreResearch@Duke**.
 - Review the BIA Core Facility's **Sample Requirements** page and download the **BIA Core Facility Sample Submission Form** which will be attached to the submitted Service Request (<https://shared-resources.dhvi.duke.edu/core-facilities/bia-core/bia-core/sample-requirements>).
 - Login** to the CoreResearch@Duke system using your NetID. You may not be able to access the system and you will not be able to submit a service request if you are not linked to the appropriate PI and fund code. Information on completing these steps is located on the CR@Duke Informational Page in the training guide titled "How to Add a Facility User and Link to a Project" (<https://medschool.duke.edu/research/shared-resources/coreresearchduke-informational-site>).
- On the main page locate and select the **Manage Service Requests** tram stop from the **Request for Service** tram line.



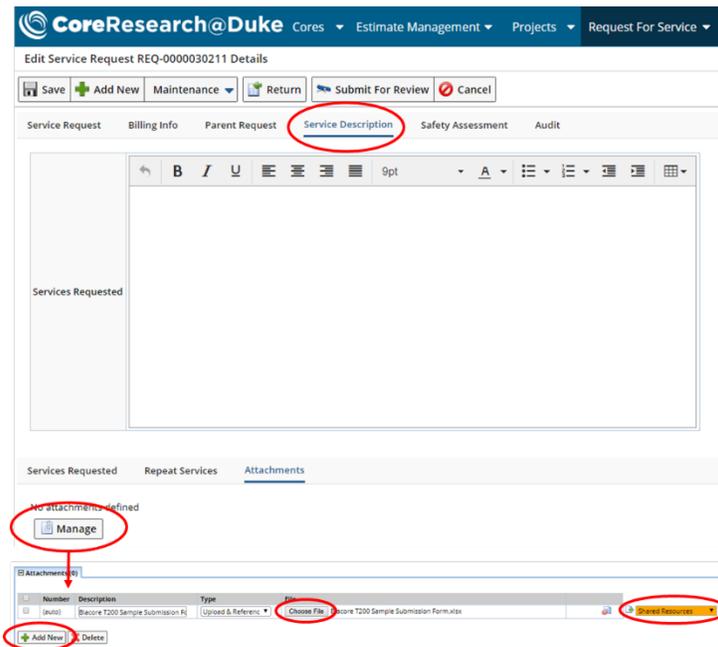
- On the next screen select **Add New Request**.



- Complete the Service Request Details including the **Title**, **Core** (Select D-0029, DHVI: BIA Core from the Select Core Window, and the desired **Project ID** (Fund Code) and once complete select **Save**.

This screenshot shows the 'Add New Service Request Details' form. The form has several tabs: 'Service Request', 'Billing Info', 'Parent Request', 'Service Description', 'Safety Assessment', and 'Audit'. The 'Service Request' tab is active. The form contains fields for 'Service Request ID', 'Title', 'Core', 'Core Name', 'Project ID', 'Requester', 'Requester Full Name', 'Requester Email Address', and 'Requester Phone Number'. The 'Title' field is circled in red. The 'Core' and 'Project ID' fields have dropdown menus, and the 'Core' dropdown is circled in red. A red box with the text '3a. Input Title. 3b. Select DHVI: BIA Core from punch-out. 3c. Select Project ID (Fund Code) from punch-out. 3d. Select Save.' points to these fields. At the bottom of the form, there is a table with columns for 'Core ID', 'Core Name', 'PI', and 'User'. The row for 'D-0029 DHVI: BIA Core' is highlighted in blue, and the 'PI' column for this row is circled in red.

4. Under the **Service Description** tab at the top, use the text box to provide a brief (2-3 sentence) description of the submitted samples and the desired experimental results and select **Save**.
 - For example, “This request is for SPR kinetic analysis and K_d measurement of proteins A and B against antibodies X, Y, and Z” or “This request is for a yes/no binding QC of protein A against the following antibodies...”
5. At the bottom, the **Services Requested** and **Repeat Services** tabs can be left blank.
6. Under the **Attachments** tab, attach the completed **BIA Core Facility Sample Submission Form** (see above). Select **Add New** and **Choose File** to locate the downloaded and completed submission form. On the right side, select the **Shared Resources** directory from the drop-down and select **Save**.



7. **Verify that the Service Request information** is correct and that the Sample Submission form was properly uploaded, **Save** the Service Request and select **Submit for Review**. At this point, the CR@Duke system will notify BIA Core personnel of your submission.
8. Email either the BIA Core Facility Manager or the specific Instrument Operator for the project to coordinate sample drop-off.