**Focused Ion Beam Applications**

2023 Course Outline

(Note: All lectures are in boldface)

# Monday, June 5

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| *Morning* |  | **Room** | **Lecturer** |
| 8:30-8:40  | **Welcome**  | 303\* | Kiely |
| 8:45-10:00 | Introduction to Focused Ion Beams | 203 | *Giannuzzi* |
| 10:00-10:20 | Break |  |  |
| 10:20-12:00 | **Physics of Ion/Matter Interaction** | 203 | Michael |
| 12:00 | Lunch  |  |  |
| Afternoon |  |  |  |
| 1:15-3:00 | Lab 1 : Software Simulations for Ion-Solid Interactions  | 257 | *Michael/Giannuzzi* |
| 3:00-3:30 | Break |  |  |
| 3:30-5:00 | Imaging with Ions | 203 | *Michael* |
| 5:15 | Dinner |  |  |
| Evening |  |  |  |
| 6:15-7:157:15-7:307:30-9:30 | Micro and Nanofabrication: Milling and Deposition for Prototyping BreakLab 2: Introduction to FIB instruments, imaging with ions, optimizing deposition and milling strategiesScios FIB/SEM  | 203271/172B | *Giannuzzi**Michael/**Giannuzzi/**Wu (Thermo Fisher)* |

\*All rooms are in Whitaker Lab unless otherwise noted

## Tuesday, June 6

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| *Morning* |  | **Room** | **Lecturer** |
| 8:30-10:00  | **SEM Sample Preparation for 2D cross-sectioning and 3D Tomography** | 203 | K. Scott |
| 10:00-10:20 | Break |  |  |
| 10:20-12:00 | Lab 3: 2D FIB sectioning and FIB set-up methods for 3D tomographyScios FIB/SEM | 271/172B | *K. Scott/Giannuzzi/Wu (Thermo Fisher)* |
| 12:00 | Lunch |  |  |
| Afternoon |  |  |  |
| 1:15-2:45 | Lab 4: Remote Zeiss Auriga – nanopatterning and 3D FIB SEM acquisition methods | 271 | *Laquerre (Fibics)/Liou* *(with Giannuzzi/K. Scott)* |
| 2:45-3:00 | Break |  |  |
| 3:00-4:004:00-5:15 | **Plasma FIB and Laser FIB/SEM**Lab 5: Remote Tescan- PFIB Lab | 203271 | *Michael**Tescan personnel**(with Giannuzzi/K. Scott)* |
| 5:15 | Dinner |  |  |
| Evening6:30-7:30 | Segmenting 3D Data Sets | 203 | *K. Scott* |
| 7:30-8:308:30-9:30 | **Ion Implantation Damage and****Redeposition During Ion Milling** Student SamplesScios FIB/SEM | 203172B | *Giannuzzi**Wu (Thermo Fisher)* |

## Wednesday, June 7

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| *Morning* |  | **Room** | **Lecturer** |
| 8:30-10:15  | **Specimen Prep for S/TEM and APT** | 203 | Giannuzzi |
| 10:15-10:30 | Break |  |  |
| 10:30-12:00 | Lab 6: S/TEM Specimen Prep I – INLO Scios FIB/SEM | 271/172B | *Giannuzzi/K. Scott/Wu**(Thermo Fisher)* |
| 12:00 | Lunch |  |  |
| Afternoon |  |  |  |
| 1:15-2:452:45-3:00 | Lab 7: S/TEM Specimen Prep II – Low Energy Polishing and APT prepScios FIB/SEMBreak  | 271/172B | *Giannuzzi/K. Scott/Wu* *(Thermo Fisher)* |
| 3:00-5:00 | Lab 8: S/TEM Specimen Prep III – APT prep and EXLO | 165 | *Giannuzzi/K. Scott* |
| Evening |  |  |  |
| 6:307:30 | Cocktail HourCourse Banquet | Wood Dining RoomWood Dining Room |  |

## Thursday, June 8

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| *Morning* |  | **Room** | **Lecturer** |
| 8:30-10:0010:00-10:1510:15-12:00  | Lab 9. *ex situ* Lift Out Break**Organic Materials and Cryo-FIB Applications** | 165 203 | *Giannuzzi/K. Scott/Michael**K. Scott* |
| 12:00 | Lunch |  |  |
| Afternoon |  |  |  |
| 1:15-2:15 | **Cryo-FIB TEM** | 203 | *Giannuzzi* |
| 2:15-3:003:00-3:15 | Break**FIB/SIMS/RAMAN** | 271 | *Giannuzzi* |
| 3:15-5:00 | **3D FIB/SEM for resin embedded biological samples** | 271 | *K. Scott* |
| 5:15 | Dinner |  |  |
| *Evening* |  |  |  |
| 6:30-9:30  | Lab 10: 3D Visualization Lab | 121 | *Marsh (ORS) / (with K.Scott)* |
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## Friday, June 9

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| *Morning* |  | **Room** | **Lecturer** |
| 8:30-9:159:15-9:45  | Post-FIB Cleaning of TEM SpecimensSelecting FIB Tools and Wrap-Up Q&A | 203203 | *Bonifacio (Fischione)**K. Scott* |
| 9:45-10:00 | Break |  |  |
| 10:00-12:00 | Lab 11: Nanomill Lab demoLab 12: Student Samples and Hands-On LabScios FIB SEM | 172F172B | *Bonifacio (Fischione)**Wu (Thermo Fisher)* |
| 12:00 | Lunch (box lunches – Whitaker Lobby) |  |  |
| 1:15-3:00 | Lab 13: OPTIONAL. Hands-on Student Lab | 172B  | *Wu (Thermo Fisher)* |