



## 2020 Wellman-HST Summer Institute for Biomedical Optics

The Harvard-MIT Program in Health Sciences & Technology and Wellman Center for Photomedicine Research Experience for undergraduates (REU) site.

Thank you for your interest in the Summer Institute.  
Please complete this application form and review the last page for submission instructions.  
The postmark deadline to apply for the Summer Institute in Biomedical Optics is January 11, 2020.

### Personal Information

Academic E-mail \_\_\_\_\_

Name \_\_\_\_\_  
Last name                      First name                      Middle initial

E-mail \_\_\_\_\_

Current address \_\_\_\_\_  
City, State, Zip

Phone \_\_\_\_\_  
Area code

Cell Phone \_\_\_\_\_  
Area code

Permanent address \_\_\_\_\_  
City, State, Zip

Emergency contact name \_\_\_\_\_  
Relationship

Emergency contact phone \_\_\_\_\_  
Area code

Your date of birth \_\_\_\_\_

Country of citizenship \_\_\_\_\_  
Your place of birth

If not a U.S. citizen, do you currently have permanent residency status?       Yes  No      Gender:  Male  Female

Optional, U.S. citizens only. Please check all ethnicities that apply to you:

- African-American
- Asian-American
- Caucasian
- Native-American
- Chicano/Mexican-American
- Puerto Rican
- Other Hispanic
- Other (please specify) \_\_\_\_\_

### Education

Current institution \_\_\_\_\_  
City, State

Major \_\_\_\_\_  
Minor, if applicable

Overall GPA \_\_\_\_\_  
i.e., 4.0, 5.0

Institution GPA scale, \_\_\_\_\_

September 2020 Status  Sophomore       Junior  
 Senior       Grad

Previous undergraduate institution, if any \_\_\_\_\_  
Dates attended

Academic honors and awards with dates \_\_\_\_\_

First generation college student?  Yes  No

### Relevant Courses

Please list the names of relevant graduate and undergraduate courses that have prepared you for the Summer Institute.

Engineering:                      Chemistry:                      Biology:                      Physics:

Total number	Total number	Total number	Total number



# 2020 WELLMAN-HST SUMMER INSTITUTE FOR BIOMEDICAL OPTICS

Name \_\_\_\_\_  
Last name First name Date

**Summer Institute Educational Objectives Cover Sheet**  
In the space provided below, please describe the following:

- 1) Your educational and career plans
- 2) Your current scientific and research interests
- 3) Your reasons for applying to this program
- 4) Your qualifications to participate in the program including any research experience unrelated to coursework that you may have had, such as lab experience or data compilation. If you have had research experience, include the names of faculty or principal investigators, duration of your participation, the larger goals of the research, and your specific role.



# 2020 WELLMAN-HST SUMMER INSTITUTE FOR BIOMEDICAL OPTICS

Name \_\_\_\_\_  
Last name First name

## Biomedical Optics Laboratory Preference

For each lab listed below, please check one of the three boxes that matches your interest level in working with that lab. A complete description of each lab is listed at <http://hst.mit.edu/academics/summer-institute/biomedical-optics>

Very Interested      Interested      Not Interested

### ***Thrust 1: Implantable/Wearable Photonic Devices***

- |                          |                          |                          |  |
|--------------------------|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1. Smart tethered capsule endoscopes (Prof. Gary Tearney, WCP)   |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 2. Implantable wireless microscope (Prof. Gary Tearney, WCP)   |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3. Implantable hydrogel optical waveguides (Prof. S.H. Andy Yun, WCP)                                      |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4. Development of mobile phone-based imaging devices (Prof. Walfre Franco, WCP; Prof. Tayabba Hassan, WCP) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5. Wearable optical sensors (Prof. Walfre Franco; Prof S.H. Andy Yun, WCP)                                 |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6. Biological cell lasers (Prof. S.H. Andy Yun, WCP)   |

### ***Thrust 2: Optical Imaging***

- |                          |                          |                          |   |
|--------------------------|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1. Intravascular polarimetry (Prof. Brett Bouma, WCP)                                       |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 2. OCT imaging of intact brains of Alzheimer's disease mouse model (Prof. Brett Bouma, WCP) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3. Development and validation of OCT quantitative angiography (Prof. Brett Bouma, WCP)      |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4. In vivo analysis of circulating blood cells (ASP. Charles Lin, WCP)                      |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5. Imaging central nervous system inflammation through the eye (ASP. Charles Lin, WCP)      |

A complete description of each lab is listed at <http://hst.mit.edu/go/summer/biomedicaloptics>



# 2020 WELLMAN-HST SUMMER INSTITUTE FOR BIOMEDICAL OPTICS

Name \_\_\_\_\_  
Last name First name

## Biomedical Optics Laboratory Preference (cont.)

Very Interested      Interested      Not Interested

- |                          |                          |                          |   |
|--------------------------|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6. Optical characterization of the bone marrow microenvironment (ASP. Charles Lin, WCP) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 7. Imaging central nervous system inflammation through the eye (ASP. Charles Lin, WCP)  |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 8. Dynamic micro-optical coherence tomography (Prof. Gary Tearney, WCP)                 |

***Thrust 3: Optical Biomechanics - from Brillouin to crosslinking***

1. Brillouin optical microscopy for cell biomechanics (Prof. S.H. Andy Yun, WCP)
2. Photo-crosslinking of tissues (Prof. S.H. Andy Yun, WCP)
3. Viscosity-based optical blood coagulation sensor (Prof. Seemantini Nadkarni, WCP)
4. Laser speckle microrheology to evaluate the mechanical hallmarks of tumor malignancy (Prof. Seemantini Nadkarni, WCP)

***Thrust 4: Nano-technologies for light-activated therapy and diagnostics***

1. Photoactivatable nanoscale drug delivery (Prof. Tayyaba Hassan, WCP)
2. Engineering molecular probes for multifocal imaging (Prof. Tayabba Hassan, WCP)
3. Quantification of near single molecule level ligand binding to white blood cells (Prof. Connor Evans, WCP)
4. Nano-enabled imaging devices (Prof. Gary Tearney, WCP)
5. Optimizing anti-tumor immune responses to combination cancer therapy with hyperspectral molecular imaging (Prof. Tayabba Hassan, WCP)

A complete description of each lab is listed at <http://hst.mit.edu/go/summer/biomedicaloptics>



# 2020 WELLMAN-HST SUMMER INSTITUTE FOR BIOMEDICAL OPTICS

Name \_\_\_\_\_  
Last name First name

## Application Checklist

Agree to the applicant statement below.

Tell us how you learned about the Summer Institute, including the URL:

\_\_\_\_\_

Save this application form on your computer as a pdf, complete the form, and then email it to Jonathan Lawson at BioOpticsSummerInstitute@mgh.harvard.edu.

Arrange for supplementary materials to be sent directly to the above email address.

Official transcripts from all undergraduate colleges or universities.

Two letters of recommendation sent separately using the provided cover sheets. Letters of recommendation should come from a current or past teacher, faculty instructor, research advisor, supervisor, or director who is familiar with your work. Please remind your references of the January 11, 2020 deadline.

The deadline to apply for the Summer Institute is January 11, 2020. Email is preferred. Supplementary materials may be mailed to the address below. They must be postmarked by this date. Only complete applications will be considered. Please send all supplementary materials to:

Wellman-HST Summer Institute for Biomedical Optics  
Attention: Jonathan Lawson  
Massachusetts General Hospital  
Wellman Center for Photomedicine  
65 Landsdowne Street, Room 528  
Cambridge, MA 02139  
BioOpticsSummerInstitute@mgh.harvard.edu  
(617) 768-8705

## Applicant Statement

I certify that I will be able to participate for the full duration of the Biomedical Optics Summer Institute, from Monday, June 1, 2020 through Thursday, August 7, 2020. Please note that program dates may be adjusted.

I certify that I am a US Citizen or Permanent Resident of the United States of America.

I certify that the information provided on this application and supplementary documents is true and complete. I understand that misrepresentation or withholding information may result in the rejection of consideration for this program or termination at any time during the program.

I hereby agree to waive my right to view letters of recommendation and release the educational institutions and related individuals from all liability in responding to inquiries regarding my application. I release the Harvard-MIT Health Sciences and Technology, the Massachusetts General Hospital, and all other program-affiliated institutions from any liability related to such inquiries.

I agree to abide by all program requirements, policies and practices.

Signature \_\_\_\_\_

Date \_\_\_\_\_