MICROFLUIDICS IN BIOMEDICAL SCIENCES TRAINING PROGRAM
UNIVERSITY OF MICHIGAN

Student Name: _____
Student Advisor: _____
Program: _____

PROGRAM CHECKLIST FOR MBSTP STUDENTS

Students who are supported by the MBSTP Training Grant are expected to perform the following activities as requirements:

_____Complete the core course, CHE 696 Microfluidics.

_____Take one Biology course. The attached list shows classes that are automatically approved. Other classes may be approved by the Executive Committee (E.C.). To obtain approval, make a request by email to Prof. Takayama (takayama@umich.edu) that gives the course number and syllabus or other course description.

_____Complete an Interdisciplinary research requirement. Students must gain experience working on a project that extends beyond the discipline of their dissertation advisor's laboratory. This may take the form of a rotation, cross-training in a collaborator's lab, or industrial internship. Students in Engineering or Physical Sciences are generally expected to work with a biomedical researcher for the interdisciplinary requirement and vice versa. It is expected that the equivalent of six weeks cross-training be met while on the grant. The form of the requirement is flexible, but all students must submit a 0.5 to 1.0 page description of their interdisciplinary plans to Prof. Takayama for approval by the E.C.

_____Construct a dissertation committee that includes at least one interdisciplinary professor. An engineering student may select someone from the Medical, Life, and/or Health-related Sciences. A physical or biology oriented student may select an engineering professor. This person may also be the collaborator or co-mentor from the interdisciplinary program.

_____Seminar series: Students are required to attend 80% of the available Microfluidics Seminar series.

_____Symposium: Students are required to attend the annual Microfluidics in Biomedical Sciences Symposium and participate by presenting a poster.

_____Participate in a monthly Journal Club led by a Microfluidics Training Program Faculty.

_____Complete a Workshop on Rapid Prototyping of Microfluidic Devices sponsored by the Training Grant. (Not required if already experienced in microfab).

_____Complete Ethics in Research course. Previously, this involved using PEERS system. It is now required that students take PIBS 503.

_____Dissertation research should show evidence of using Microfluidics in Biomedical Sciences.

_____When requested, enter information on M-TRAIN and X-TRAIN.

_____Attend NIBIB meeting.

Approved Biology Courses:

_____415 Introductory Biochemistry
Prerequisite: Two Terms of Organic Chemistry equivalent to Chem. 225 and 226. No credit to those who have completed or are enrolled in Biology 411.
_____Biology 525/526 - Chemical Biology I & II
_____Biology 427 - Molecular Biology
Prerequisite: Biology 305; Biology 310, 311; BioChem. 415 or Chem. 451; or Graduate Standing.
_____Biology 428 - Cell Biology
_____Biological Chemistry 578 - Biochemical Techniques
_____CDB 530 Cell Molecular Biology

RECOMMENDATIONS

Beside the requirements, we highly recommend the following:

_____Take an elective course from the attached list.

_____Take either ES 715 - Innovative New Business Design course, industry track, or Pharm 502 - Grant Writing, academic track.

_____Participate as an officer in the Microfluidics Seminar and Workshop series.

I. Course Electives

Taking at least one of the following courses is recommended, but not required:

Chemical Engineering Courses:

_____444 - Applied Chemical Kinetics
_____527 - Fluid flow
Prerequisite: ChemE 341
_____543 Advanced Separations Processes
Prerequisite: ChemE 343
Additional ChE Courses (currently listed as ChE 696):
Biomolecular Engineering, Instructor: Joerg Lahann
Nana-bio Assemblies, Instructor: Mark Burns, Ron Larson
Nanocolloids and Nanomaterials, Instructor: Nick Kotov
Molecular Systems Biology, Instructor: Peter Woolf

Electrical Engineering Courses:

_____EECS 414 Introduction to MEMS
_____EECS 423 - Solid –State Device Laboratory
Prerequisite: EECS 320 or Graduate Standing
_____EECS 425 - Integrated Microsystems Laboratory

Prerequisite: EECS 311, or EECS 312, or EECS 414, or Graduate Standing
_____EECS 528 - Principles of Microelectronics Process Technology
Prerequisite: EECS 421 or EECS 423
_____EECS 515 - Integrated Microsystems
Prerequisite: EECS 414

Biomedical Engineering Courses:

_____BiomedE 476 (ME 476) – Biofluid Mechanics
Prerequisite**:** ME 235, ME 320, and ME 370
_____BiomedE 479- Biotransport
Prerequisite: Math 216, ME 330, or permission of instructor
_____BiomedE 561- Biological Micro- and Nanotechnology
Prerequisite: Biology 162, Intro Physics and Chemistry, Senior Standing or permission of Instructor.

Mechanical Engineering Courses:

_____ME 406 – Biomechanics for Engineering Students
_____ME 476 (BME 476) – Biofluid Mechanics
_____ME 599 Transport in Microfluidic Systems

Material Science Engineering Courses:

_____MSE 410 – Biomaterials
_____MSE 505 – Materials Science of Thin Films
_____MSE 512 – Polymer Physics
_____MSE 516 - Mechanics of Thin Films
_____MSE 583 – Biocompatibility of Materials

Chemistry Courses:

_____Chemistry 545 – Analytical Chemistry
Prerequisites: Chem 447, 461
_____Chemistry 646 – Separation Processes
Prerequisites: Che 545 and Graduate Standing

Other courses (please list other courses taken at U of M):

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_____
_____
_____
_____
_____

II. Required Lab Rotation or Interdisciplinary Collaboration

Lab and Dates of Rotation

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_____

Project Thesis

_____

_____

Project Description

_____

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(Separate pages can be attached)

III. Dissertation Committee

Professor _____ Department _____
Professor _____ Department _____
Professor _____ Department _____

IV. Workshops

Rapid Prototyping:
This workshop provides hands-on experience in the design and fabrication of a single layer polymer microfluidic device. Over the course of three sessions, participants receive training in device design, use of layout software, lithography, PDSM casting, and device assembly. During the final workshop, participants test the fluidic operation of the devices they have created. Two of the three sessions make use of the clean room facilities available in the Chemical Engineering Department.

Date/Session Workshop completed: _____

V. Student Events and Participation

a. Microfluidics Seminar Series

Dates attended: _____

_____

Student/Faculty Meetings, Journal Club

Dates attended: _____

_____

b. MBSTP Annual Symposium

Years attended: _____

Poster Title(s):

_____

_____

_____

_____

c. Scientific Meetings/Conferences attended:
(Example: Y. Elkasabi, M. Yoshida, J. Lahann. "Reactive poly (*p*-xylene) co-polymer coatings: combinations of functionalities in defined ratios" AIChE Annual Meeting, Salt Lake City, UT 2007)

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d. Published Papers
(Attributed to NIH-MBSTP T32 EB005582 and published full text in PubMed within one year)

Publication details:

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