Prototyping Point-of-Care Diagnostics (重點照護檢驗實作)   **Spring 2020**

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Office Hour:	By appointment
Lecture:	MaMbMc

Credits 3

Prerequisites
None, unless your background is not in engineering. If this is the case, then please come talk to me first for "Instructor Permission". In addition, a background in cell and molecular biology as well as mechanics will be helpful in this class (although not required).

Course Objectives
　　How to achieve accurate diagnoses–the first step in both appropriate prevention and treatment of specific diseases–has been a longstanding but interesting issue in medicine. With recent technological advances in multiple research fields such as materials science, micro-/nano-technology, cellular and molecular biology and bioengineering, much attention is shifting toward the development of new diagnostic tools that address needs not only for high sensitivity and specificity but fulfill economic, environmental, and rapid point-of-care needs for groups and individuals with constrained resources and, possibly, limited training. Microtechnologies, in particular, are considered very powerful tools for the diagnosis and monitoring of human diseases. Miniaturized fluidics-based platforms that precisely manipulate tiny body fluid volumes can be used for medical or healthcare diagnosis in a rapid and accurate manner. These diagnostic technologies are potentially applicable to different healthcare issues, since they are disposable, inexpensive, portable, and easy to use for the detection of human diseases (e.g., cancers or infectious diseases). The purpose of this class is to bridge microtechnologies (both PDMS-based and paper-based microfluidics with others) and biology with medicine, focusing more on the applications of microdevices or microsystems for point-of-care diagnostics.

Textbook N/A; class notes/journal papers/magazine articles

Grade
Experiment, Report & Presentation 100%

Tentative Schedule
Experiment & Presentation (I want all of you to really make a diagnostic chip)
1) substrate preparation (wax printing and so on) 2-3 weeks
2) antibody-antigen conjugation 3 weeks
3) enzyme immobilization 3 weeks
4) buffer test 3 weeks
5) maybe, clinical sample test 2-3 weeks
6) presentation 1 week