**EPFL**

BIOENG-610 **On Governing Risks of Emerging Technologies (2019)**

Oye Kenneth Akito

| Cursus | Sem. | Type |
|---|---|---|
| Biotechnology and Bioengineering | | Obl. |
| Computational and Quantitative Biology | | Obl. |

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| Language of teaching | English |
| Credits | 2 |
| Session | |
| Exam | Written & Oral |
| Workload | 60h |
| **Hours** | **22** |
| Courses | 14 |
| TP | 8 |
| **Number of positions** | **18** |

**Frequency**

Only this year

**Remark**

Next time: Spring 2019

**Summary**

This course covers analytic approaches to risk assessment and governance, then develops cases on safeguard design and testing to limit risks of: gene drive disease control; biosynthesis of materials; and health data and apps to care of patients and recruit subjects for clinical trials.

**Content**

This course is designed to inform deliberation on responsible innovation and risk governance by students in science, engineering and management. It will provide basic training on analytic approaches to risk assessment and governance and also focus on in depth cases in rapidly changing technological fields.

Week 1:  Description and evaluation of risk assessment and forecasting methods in light of contemporaneous projections of benefits and risks of past emerging technologies such as the automobile, laser, internet, and GPS.

Week 2:  Description and evaluation of precautionary, permissive and adaptive approaches to risk governance in light of cases on transportation, flood control, diet standards, air standards, drug licensing and other policy areas.

Weeks 3 4 5 6:  Regular class meetings on concepts and parallel working group meetings on cases.
Regular Class Meetings on Concepts
Week 3:  On development and testing of technical safeguards in historical cases
Week 4:  On credible knowledge assessment in areas of uncertainty and controversy
Week 5:  On multi-stakeholder and regulatory engagement in evaluation of safeguards
Week 6:  On legal and ethical duties of scientists, engineers and managers
Parallel Working Groups on Cases
Applications to current emerging technology cases drawn from synthetic biology, pharmaceuticals, and AI / information technology with emphasis on the design and testing of technical safeguards to mitigate risks.  Students will work on one of the cases below.
*  gene drive applications to control vector-borne diseases, with emphasis on safeguards to limit gene
   drive effects to specific geographic locales and/or specific subsets of target species.
*  materials synthesis using pathways in biological chassis, with emphasis on safeguards to limit
   environmental effects of release by reducing   gene transfer and fitness.
*  health data and app use to advise and monitor patients and/or to identify, recruit and monitor
   subjects for clinical trials, with emphasis on safeguards protecting privacy and informed consent.
Each case will be developed by mixed teams of students.
*  Scientists will focus on risk assessment under conditions of uncertainty and controversy, with

  emphasis on the validity of evidence and on factors affecting the credibility of assessments.
* Engineers will focus on design and testing of safeguards to mitigate risks, with attention to
  development of intrinsic technical safeguards and of credible methods of testing.
* Managers will focus on development of nonmarket strategies to shape regulations and standards to
  advantage firms, with emphasis on linking R&D, regulatory affairs and marketing.

Week 7: Presentations of cases by teams to a panel of regulators, insurers, and risk governance experts. The final
meeting of the seminar may be longer than 2 hours.

**Note**

NOTE ON DATES/TIMES OF COURSE:  Tuesday 9.4.2019 to Tuesday 28.5.2019, from 4-6 PM for the regular meeting
times.  There will also be parallel working group meetings during weeks 3-6.

**Keywords**

Risk governance
Responsible research