Controls concentration

(Systems, Robotics, Controls area)

ECE Dept Curriculum Committee

Wed May 18 2022

ABET requirements

ENGINE capstone projects are challenging

- Diversity of real-world design problems, e.g.
  - Boeing (fuselage inspection)
  - Microsoft (data center maintenance)
  - Seattle Art Museum (active seismic isolation)
  - UW Medicine (cyclotron; micro-collimator)

ABET outcome assessments

- Outcome 1 (& 6 pre-COVID) assessed in 447
- Reports missing from Sp19, Sp20, Sp21

ABET outcome assessments

Outcome 1

- Fa 2018 (9 assessed): 1 N / 3 D / 1 C / 4 E
- Fa 2019 (9 assessed): 1 N / 3 D / 4 C / 1 E
- Fa 2020 (6 assessed): 0 N / 2 D / 2 C / 2 E
- Fa 2021 (6 assessed): *data missing from site …*

Outcome 6 (pre-COVID)

- Fa 2018 (6 assessed): 0 N / 3 D / 4 C / 2 E
- Fa 2019 (6 assessed): 0 N / 2 D / 6 C / 1 E

key: N = “novice”, D = “developing”, C = “competent”, E = “exemplary”

enrollment and graduation

course enrollment is flat …

- 447 (control systems analysis):
  - required by 2 concentrations (Power)
  - recommended by 1 concentration (Biomed. Instr.)
  - **from 2019:** offered twice each year (Fa + Sp)
  - enrollment has been flat at ~70/yr since 2017

… so graduate % has decreased

- Concentration graduates:
  - 38 from Su 2019 – Sp 2021 (~9% of ECE graduates)
  - 38 from Fa 2017 – Su 2019 (~9.5% of ECE graduates)

required classes

fewest required non-capstone credits of all ECE concentrations: 18 credits

- 271 (digital logic; 5cr)
- 342 (digital signal processing; 5cr)
- 447 (control systems analysis; 4cr)
- 474 (embedded systems; 4cr)

capstone transitioned to ENGINE (497/498)

- 497/498 (capstone; 4cr + 4cr)

suggested revisions

1. *rework 448: "data-driven control" lab*

- system identification / predictive analytics
- optimal control / reinforcement learning
- applications from robotics, CPS, neuroeng, …

2. *relax prerequisites*

want: Control option in "Computing Pathway"

- 233 is "helpful" but not "essential"
- 242/342 provide required background

backup slides

class list – undergrad, *grad*

- **447: control system analysis**
- **448: (future) “data-driven control”**
- *547: Advanced linear control systems*
- *548: Linear multi-input / multi-output*
- *549: State estimation and system identification*
- *550: Optimal control*
- *570: Geometric control*
- *582: Digital control*
- *583: Nonlinear control*
- *585: Adaptive control*
- *593: Feedforward control*
- *594: Robust control*
- *597: Network control*

faculty and research areas

Prof. Linda Bushnell	networked control, cyber security
Prof. Sam Burden	sensorimotor control
Prof. Howard Chizeck	brain-computer interface (BCI)
Prof. Maryam Fazel	convex optimization
Prof. Blake Hannaford	medical robotics, telerobotics
Prof. Eric Klavins	systems biology
Prof. Alex Mamishev	sensor design and integration
Prof. Lillian Ratliff	cyber-physical systems (CPS)
Prof. Matt Reynolds	ultra-low-power sensing, computation
Prof. Georg Seelig	systems biology
Prof. Eli Shlizerman	data-driven dynamical systems
Prof. Baosen Zhang	cyber-physical systems (CPS)