SYDE 556/750
Simulating Neurobiological Systems
Lecture 0: Administrative Remarks

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Based on lecture notes by
Chris Eliasmith and Terrence C. Stewart

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Course website:
`http://compneuro.uwaterloo.ca/courses/syde-750.html`

Contents

1 Organization

- **Course website**
  Links to all course material, including slides and these lecture notes and slides can be found at the following URLs:

  - `http://compneuro.uwaterloo.ca/courses/syde-750.html`
  - `https://github.com/astoeckel/syde556-w20`

  Note: Any material on GitHub should be considered "preliminary" until officially linked at from the course website. Until then, the material is still subject to change.

- **Instructor**
  Andreas Stöckel
  Office: E7-6342 (office hours in E7-6323)
  Email: `astoecke@uwaterloo.ca`
  Website: `http://compneuro.uwaterloo.ca/people/andreas-stoeckel.html`

- **Course times and location**

  - Tuesday: 11:30-12:50 in E5-4106 (SYDE 556/750)
  - Thursday: 9:00-10:20 in E5-6004 (SYDE 556/750)
  - Thursday: 10:30-11:20 in E5-6127 (SYDE 750, optional for 556)

- **Office hours**

  - Office hours are generally in E7-6323 (this is a larger conference room).
  - Time yet to be determined, one fixed office hour per week.
  - Alternatively, if that time doesn't work for you, by appointment.

- **Readings**

  - Main resource: "Neural Engineering", Chris Eliasmith and Charles Anderson, 2003 [1]
  - Optional: "How to Build a Brain", Chris Eliasmith, 2012 [2]

2 Coursework

- **Four assignments** (worth 60% of the final mark)
  - The assignments are worth 20%, 20%, 10%, 10% of the final mark, respectively.
  - You have about two weeks for each assignment.
  - You are free to discuss the assignments with other students, but do not take any (written) notes during such discussions. Everyone must write their own code, generate their own graphs, and write their own answers.
  - These assignments (particularly the first two) are a lot of work, so start early.
- **Final project** (worth 40% of the final mark)
  - We will have short project presentations in the final week, which are worth 5% of the final mark. The written report will be worth 35%.
  - Build a model of some neural system
  - For 556 students, this can be an extension of something seen in class or something that is listed in the book.
  - For 750 students, this must be more of a research project with more novelty.
  - Potential ideas are collected here.
  - In any case, your project idea needs to be approved via email before Reading Week (i.e., on February 14).
  - See the project page for more information.

3 Schedule

Date	Reading	Topic	Assignments
WEEK 1			
Jan 7	Chapter 1	Introduction	
Jan 9	Chapter 2	Neurons	
WEEK 2			
Jan 14	Chapter 2	Population Representation (I)	#1 posted
Jan 16	Chapter 2	Population Representation (II)	
WEEK 3			
Jan 21	Chapter 4	Temporal Representation (I)	
Jan 23	Chapter 4	Temporal Representation (II)	
WEEK 4			
Jan 28	Chapters 5, 6	Feedforward Transformations (I)	#1 due*, #2 posted
Jan 30	Chapters 5, 6	Feedforward Transformations (II)	
WEEK 5			
Feb 4	Chapter 8	Dynamics (I)	
Feb 6	Chapter 8	Dynamics (II)	
WEEK 6			
Feb 11	Chapter 7	Analysis of Representation	#2 due*, #3 posted
Feb 13	*provided*	Temporal Basis Functions	
Feb 14			Project proposal due
WEEK 7		*— Reading week, no lectures —*	
WEEK 8			
Feb 25	*provided*	Symbols (I)	
Feb 27	*provided*	Symbols (II)	
WEEK 9			
Mar 3	Chapter 8	Memory	#3 due*, #4 posted
Mar 5	*provided*	Action Selection	
WEEK 10			
Mar 10	Chaper 9	Learning (I)	
Mar 12	Chaper 9	Learning (II)	
WEEK 11			
Mar 17	*provided*	Spatial Semantic Pointers	#4 due*
Mar 19	*provided*	Biological Details	
WEEK 12			
Mar 24	*provided*	Other modelling frameworks	
Apr 2		Conclusion	
WEEK 13			
Mar 31, Apr 2		Project presentations	
WEEK 15			
Apr 15			Projects due*

* The project and all assignments are due at midnight (≈ 11:59p EST) of that day.

4 Things you should do to get started

- Get the textbook ("Neural Engineering", Chris Eliasmith and Charles Anderson, 2003)
- Be able to run `jupyter lab` or `jupyter notebook` with a Python 3 kernel. Install `numpy`, `scipy`, and `matplotlib`. Anaconda is a Python distribution that ships with these packets preinstalled, so (depending on your platform) this might be the easiest to use.
- Start thinking about a project... already.

References

[1] Chris Eliasmith and Charles H. Anderson. *Neural Engineering: Computation, Representation, and Dynamics in Neurobiological Systems*. Cambridge, Massachusetts: MIT Press, 2003. 380 pp. ISBN: 978-0-262-55060-4.

[2] Chris Eliasmith. *How to Build a Brain: A Neural Architecture for Biological Cognition*. Oxford Series on Cognitive Models and Architectures. New York, New York: Oxford University Press, 2013. 456 pp. ISBN: 978-0-19-026212-9.