

# 2020 Fall "Advanced Affective Neuroscience" at SKKU GBME (graduate course)

- Lecturer: Choong-Wan Woo, Ph.D. Assistant professor (GBME).
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- Class: Friday 12:00-3:00PM at 86314 - it can be changed.
- Office hours: Wed 10:30-12:00, you can book a time in advance through <https://choongwanwoo.youcanbook.me>

## Download

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You can download the class materials using the following command line.

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$ git clone https://github.com/wanirepo/AffectNeuro_2018Spring
```

Once you clone the github repository, you can just type the following command to get the updated github repository.

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$ git pull
```

Or you can download the repository as a zip file or you can also use [GitHub Desktop](#). The class materials will be uploaded (e.g., lecture slides, assignments) before each class.

There is a good github tutorial: <https://rogerdudler.github.io/git-guide/index.html>

## What are the aims of this course?

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Joyful, happy, sad, angry, disgusting, painful, bored... we experience these emotions all the time, and these experience keep changing every moment. How can we "define" emotions?

How can we "study" emotions? What are the "bodily factors" that influence emotions? How we "measure" bodily response of emotions? What are the "brain representations" of emotions? Are emotions same with affect or feelings? How can we model the "dynamics" of emotions? What are the underlying problems in emotional disorders, like anxiety and depression? etc. There are so many interesting questions about emotions. In this class, you will first learn methodologies for affective neuroscience (focusing on fMRI; for this, we will use Tor and Martin's [coursera](#) materials), and learn some key topics of affective neuroscience. We will also read and discuss some key papers (one or two papers per week) in affective neurosciences together.

## Course format and expectations

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This course will consist of three parts--fMRI methods, lectures, and paper presentations. First, for the fMRI methods, you will be asked to watch the video lectures before coming to the class. We will do a brief Q&A (first 10 - 20 mins) for the fMRI methods. Second, I will give a brief lecture (~30 mins) for an affective neuroscience topic for each week. Note that many of my lectures will re-use my PhD advisor Tor Wager's Affective Neuroscience class slides. Third, you will give presentations on the papers related to the topic, and we will have a discussion about the paper. We will use English as the main language, but you can use Korean to ask questions and discuss.

## Evaluation

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1. Attendance (30%)
2. Discussion participation (30%)
3. Presentation (15%)
4. Method assignment (10%)
5. Final paper/presentation (15%)

## Method writing assignment

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As a mid-term assignment, you will be asked to write and submit a method section of the paper that you are working on. If you don't have a working paper, please submit one-page proposal explaining what you will write for the term paper. Deadline: 6PM 5/11 (Friday)

## Term paper

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You can choose one among the following three options. (1) You can submit a research paper draft if your research topic is related to emotions. The paper should have at least three parts of the full article (e.g., Introduction, Methods, and Results, or Introduction, Results, and

Discussion, etc.) (2) You can write about your own research idea on emotions with an experiment plan and design. In this case, you need to write introduction and method sections. ~5 pages (12 pt, line spacing 1.5) (3) You can write about a "perspective" type piece on any issues related to emotion research. Free format, ~5 pages. You will be presenting your final paper on the last day of the class (6/21). We will have dinner together afterwards!

## Schedule

Week	Lecture	Paper
Week 1 (9/4)	Class overview	Paper Assignment
Week 2 (9/11)	Affective neuroscience	TBD
Week 3 (9/18)	Brain anatomy	TBD
Week 4 (9/25)	건학기념일	no class
Week (10/2)	추석	no class
Week 5 (10/9)	한글날	no class
Week 6 (10/16)	Affective brain systems	TBD
Week 7 (10/23)	Pleasure and desire	TBD
Week 8 (10/30)	mid-term	
Week 9 (11/6)	Touch and nociception	TBD
Week 10 (11/13)	Pain	TBD
Week 11 (11/20)	Emotion theories and brain	TBD
Week 12 (11/27)	Desire/emotion regulation, embodiment	TBD
Week 13 (12/4)	Unconscious affect	TBD
Week 14 (12/11)	Social Brain, Empathy	TBD
Week 15 (12/18)	Final	

*Note.* Weekly plan described above can be adjusted as our class develops. (R): Review paper. (E): Empirical paper

## Books (not required)

Elizabeth Johnston & Leah Olson, "The Feeling Brain: The Biology and Psychology of Emotions", 2015

Lisa Feldman Barrett, "How Emotions Are Made: The Secret Life of the Brain", 2017

Jaak Panksepp, "Affective Neuroscience: The Foundations of Human and Animal Emotions", 1998

## Papers (in progress)

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- MacLEAN, P. D. 1949. "Psychosomatic Disease and the Visceral Brain; Recent Developments Bearing on the Papez Theory of Emotion." *Psychosomatic Medicine* 11 (6): 338–53.
  - (Pogliano, Claudio. 2017. "Lucky Triune Brain. Chronicles of Paul D. MacLean's Neuro-Catchword." *Nuncius / Istituto E Museo Di Storia Della Scienza* 32 (2): 330–75.)
- Garcia, J., W. G. Hankins, and K. W. Rusiniak. 1974. "Behavioral Regulation of the Milieu Interne in Man and Rat." *Science* 185 (4154): 824–31.
- Mesulam, M. M. 1998. "From Sensation to Cognition." *Brain: A Journal of Neurology* 121 ( Pt 6) (June): 1013–52.
- Saper, Clifford B. 2002. "The Central Autonomic Nervous System: Conscious Visceral Perception and Autonomic Pattern Generation." *Annual Review of Neuroscience* 25 (January): 433–69.
- Craig, A. D. 2002. "How Do You Feel? Interoception: The Sense of the Physiological Condition of the Body." *Nature Reviews. Neuroscience* 3 (8): 655–66. Craig, a. D. Bud. 2009. "How Do You Feel–now? The Anterior Insula and Human Awareness." *Nature Reviews. Neuroscience* 10 (1): 59–70.
  - Craig, A. D. (bud). 2003. "PAIN MECHANISMS: Labeled Lines Versus Convergence in Central Processing." *Annual Review of Neuroscience* 26 (1): 1–30.
- Buckner, Randy L., and Daniel C. Carroll. 2007. "Self-Projection and the Brain." *Trends in Cognitive Sciences* 11 (2): 49–57.
- Price, Joseph L., and Wayne C. Drevets. 2012. "Neural Circuits Underlying the Pathophysiology of Mood Disorders." *Trends in Cognitive Sciences* 16 (1): 61–71.
- Damasio, Antonio, and Gil B. Carvalho. 2013. "The Nature of Feelings: Evolutionary and Neurobiological Origins." *Nature Reviews. Neuroscience* 14 (2): 143–52.
- Barrett, Lisa Feldman, and W. Kyle Simmons. 2015. "Interoceptive Predictions in the

Brain.” Nature Reviews. Neuroscience 16 (July). <https://doi.org/10.1038/nrn3950>.

Chanes, Lorena, and Lisa Feldman Barrett. 2016. “Redefining the Role of Limbic Areas in Cortical Processing.” Trends in Cognitive Sciences 20 (2): 96–106.

- Barbas, H. (2015) General cortical and special prefrontal connections: principles from structure to function. Annu. Rev. Neurosci. 38, 269–289
- Man, Kingson, and Antonio Damasio. 2019. “Homeostasis and Soft Robotics in the Design of Feeling Machines.” Nature Machine Intelligence 1 (10): 446–52.
- Melzack, Ronald, and Patrick D. Wall. 1965. “Pain Mechanisms: A New Theory.” Science 150 (3699): 971–79.
  - Melzack, R. 1999. “From the Gate to the Neuromatrix.” Pain Suppl 6 (August): S121–26.
- Berridge, Kent C. 2019. “Affective Valence in the Brain: Modules or Modes?” Nature Reviews. Neuroscience, February, 1.
- Ledoux

James Gross

Berridge

Adolphs

Melzack

- Price2012(R): Neural circuits underlying the pathophysiology of mood disorders, TICS
- Saper2002(R): The central autonomic nervous system: Conscious Visceral Perception and Autonomic Pattern Generation, Annu Rev Neurosci
- Berridge2015(R): Pleasure Systems in the Brain, Neuron
- Rutledge2014(E): A computational and neural model of momentary subjective well-being, PNAS
- Melzack1999(R): From the gate to the neuromatrix, PAIN
- Segerdahl2015(E): The dorsal posterior insula subserves a fundamental role in human pain, Nat Neurosci
- Salomons2015(E): The “Pain Matrix” in Pain-Free Individuals, JAMA Neurol
- Tracey2010(R): Getting the pain you expect: mechanisms of placebo, nocebo and reappraisal effects in humans, Nat Med
- Wager2013(E): An fMRI-Based Neurologic Signature of Physical Pain, NEJM
- Geuter2017(R): The Cognitive Neuroscience of Placebo Effects: Concepts, Predictions, and Physiology, Annu Rev Neurosci
- Leknes2008(R): A common neurobiology for pain and pleasure, NRN

- Goldstein2018(E): Brain-to-brain coupling during handholding is associated with pain reduction, PNAS
- Gross2011(R): Emotion Generation and Emotion Regulation: One or Two Depends on Your Point of View, Emotion Review
- Kragel2016(E): Decoding Spontaneous Emotional States in the Human Brain, PLoS Biol
- Etkin2015(R): The neural bases of emotion regulation, NRN (bonus: Raio's commentary + Etkin's reply)
- Gilead2016(E): Self-regulation via neural simulation, PNAS
- Giuliania2018(R): Neural predictors of eating behavior and dietary change, ANYAS
- Lim2016(E): The child brain computes and utilizes internalized maternal choices, Nat Comms
- Niedenthal2007(R): Embodying Emotion, Science
- Nummenmaa2013(E): Bodily maps of emotions, PNAS
- Berridge2003(R): What is an unconscious emotion?, Cognition and Emotion
- Jensen2015(E): Classical conditioning of analgesic and hyperalgesic pain responses without conscious awareness, PNAS
- Herry2014(R): Encoding of fear learning and memory in distributed neuronal circuits, Nat Neurosci
- Onat2015(E): The neuronal basis of fear generalization in humans, Nat Neurosci
- Reeck2015(R): The Social Regulation of Emotion: An Integrative, Cross-Disciplinary Model, TICS
- deBerker2016(E): Computations of uncertainty mediate acute stress responses in humans, Nat Comms

#### Further readings:

- Clore & Ortony
- Melzack 1965
- Ashar 2017
- Navratilova 2014
- Kragel 2016 TICS
- Barrett 2015
- Heatherton 2011 TICS
- Ochsner 2005