Utah Valley University | Department of Architecture and Engineering Design

Course Reading & Assignment Packet

ARC 4530 | Culture & Behavior in Architecture | Prof. Brandon Ro, AIA, NCARB

COURSE ASSESSMENT

ORGANIZATION

The following packet outlines the required weekly exercises, videos, lectures, and readings. Each week is organized thematically. A series of key concepts are provided to the student to consider as they read, study, and discuss the ideas found in the readings and videos.

- **ATTENDANCE / PARTICIPATION** (100 POINTS) – Students are required to attend and actively participate in each weekly class session. The seminar format for each class will consist of short lectures as well as discussions of assigned readings and videos.

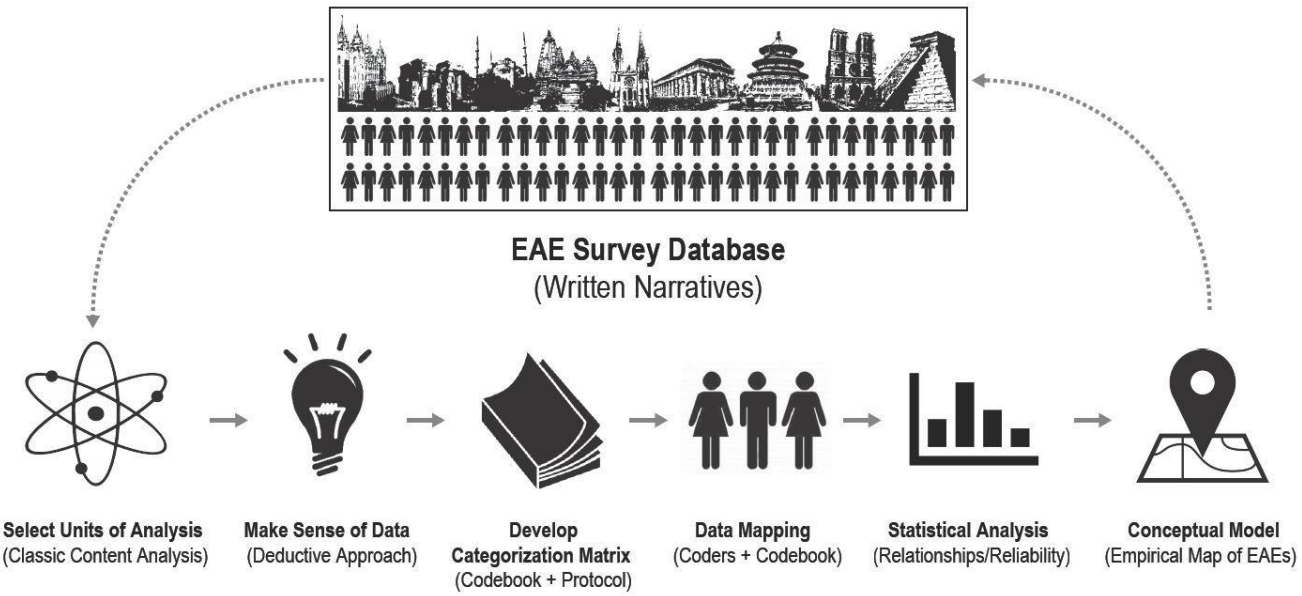
- **REQUIRED READINGS / VIDEOS** (100 POINTS) – Weekly reading and video assignments are derived from the required texts and/or provided by the instructor. Students are required to complete all assigned readings and videos PRIOR to the class lecture and discussion session for the week. It is the students' responsibility to report their completion of these tasks each week through a weekly questionnaire survey on Canvas.

- **RESEARCH PROJECT** (100 POINTS) – The Research Project is designed to demonstrate each student's ability to engage in research about the aesthetic experience of architecture from a cognitive, behavioral, and emotional viewpoint. In this context, architectural research is defined as an inquiry or investigation conducted by a student that makes an original intellectual or creative contribution to the discipline. The ultimate deliverable for the research project will be to compile and synthesize the findings in a visual format as a poster presentation and present it to the class.

- **WEEKLY EXERCISES** (200 POINTS) – Students will be given weekly exercises as part of their homework for the class. Each assignment is designed to reinforce the concepts the students are learning from the readings, videos, and lectures. Some weekly exercises will be weighted heavier based on their difficulty and time requirements.

- **EXAMS** (2 @ 250 POINTS = 500 POINTS) – Each student will test the knowledge gained in the course through two examinations. Exams will be based on key concepts, terminology, and case studies found in the assigned readings, videos, and lectures. Each exam will consist of both multiple choice and essay questions. The midterm and final exam will each cover the content for half of the class; neither exam will be cumulative.

1 – ARCHITECTURAL RESEARCH FOR PRACTICE



KEY CONCEPTS:

environment-behavior research, aesthetic experience, evidence-based design, post-occupancy evaluation, perception/cognition, neuroscience, architecture research methods, phenomenology, hermeneutics

READ:

- Hamilton, D. Kirk, and David H. Watkins. "Process and Methods for Evidence-Based Design," *Evidence-Based Design for Multiple Building Types*. Hoboken, NJ: John Wiley & Sons, 2009, pp.205-220. (PDF)
- Lord, Larry, and Margaret Serrato. "Postoccupancy Evaluation," in Joseph A. Demkin, ed. *The Architect's Handbook of Professional Practice*, 13th edition (New York: John Wiley & Sons, 2000), p.688-692. (PDF)
- Mehaffy, Michael, and Nikos A. Salingaros. "The Neuroscience of Architecture: The Good, the Bad -- and the Beautiful," *Traditional Building Magazine*, (February 2018), accessible online: https://www.traditionalbuilding.com/opinions/the-neuroscience-of-architecture
- Pentecost III, A. Ray. "The Practitioner as Researcher," in Hamilton, D. Kirk, and David H. Watkins. *Evidence-Based Design for Multiple Building Types*. Hoboken, NJ: John Wiley & Sons, 2009, pp.235-250. (PDF)
- Seamon, David. "Phenomenology and Hermeneutics: Some Thematic and Methodological Commonalities and Differences." Excerpts from "A Phenomenological and Hermeneutic Reading of Rem Koolhaas's Seattle Central Library," Ruth Conway Dalton and Christopher Hölscher (eds.), *Take One Building: Interdisciplinary Research Perspectives on the Seattle Central Library* (pp. 67-94; tables on p. 68 and p. 69). London: Routledge, 2017. (PDF)

ADDITIONAL READING

- Pati, Debajyoti. "A Framework for Evaluating Evidence in Evidence-Based Design," *Health Evironments Research & Design Journal* 4, no.3 (2011): 50-71. (PDF)
- Preiser, Wolfgang F.E., and Jack L. Nasar. "Assessing Building Performance: Its Evolution from Post-Occupancy Evaluation,"*Archnet-International Journal of Architectural Research*, 2, no.1, (March 2008): 84-99. (PDF)

WATCH:

- Mallgrave, Harry Francis. “The Future of Design Past,” presented at the 2017 Driehaus Foundation Built Environment Symposium (5min), https://youtu.be/FTkFJKbL6Go
- Sternberg, Esther. “Why Place and Well-Being are at the New Frontier of Medicine,” TEDx 2014 (30min), https://youtu.be/f8bsQAi0Rx8

COMPLETE:

- **EXERCISE 1:** Provide a written reflection for the following questions: In what ways might architects use research to improve their designs? How can evidence-based design be helpful for architects to create meaningful spaces that promote health and well-being? What types of helpful information can be gained from conducting a post-occupancy evaluation? (10 points)

2 – CULTURE IN ARCHITECTURE
(SPIRIT / KNOWLEDGE / MEANING)

KEY CONCEPTS:
Traditions, ideals, beliefs, customs, ritual, behavior patterns, meaning, symbolism, memory, organizations, social groups, socio-political status and hierarchy, community, population, gender, race, age, cultural studies (anthropology & humanities), cultural anthropology (cultural meaning, norms, values), sociology (human societies, interactions, and processes that preserve/change them), material culture, ethnocentrism, acculturation, multiculturalism, spirit of place (genis loci), ethnosphere

READ:
- Geertz, Clifford. "Ethos, World View, and the Analysis of Sacred Symbols," in *The Interpretation of Cultures: Selected Essays*, New York: Basic Books, 1973. pp. 126-141. (PDF)
- Seasoltz, Kevin. "Culture: The Context for Theology, Liturgy, and Sacred Architecture and Art," in *A Sense of the Sacred: Theological Foundations of Christian Architecture and Art*. New York: Continuum, 2005. pp.1-34. (PDF)
- Tuan, Yi-Fu. "Body, Personal Relations, and Spatial Values," in *Space and Place: The Perspective of Experience*. Minneapolis: University of Minnesota Press, 1977. pp.34-50. (PDF)

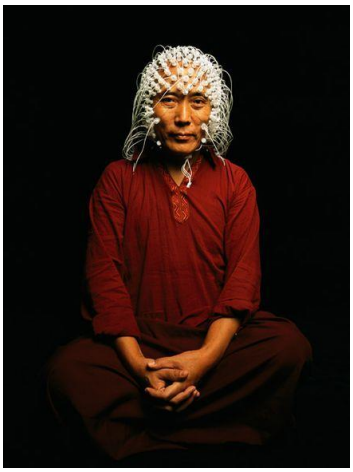
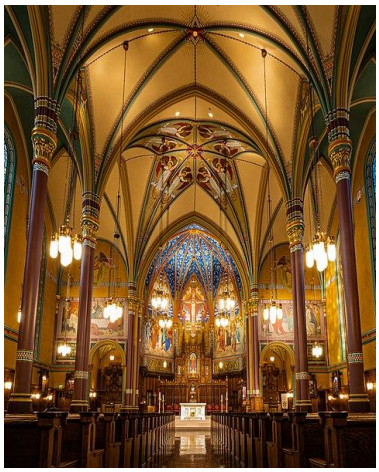
ADDITIONAL READING
- Bermudez, Julio, and Brandon Ro. "The Effect of Gender, Age, and Education in Extraordinary Aesthetic Experiences." In *Healthy + Healing Places: Proceedings of the 44th Annual Conference of the Environmental Design Research Association*, edited by Jeremy Wells and Elefterios Pavlides, 279-80. Providence, RI: Environmental Design Research Association, 2013. Available online: https://www.academia.edu/3779013/The_Effect_of_Gender_Age_and_Education_in_Extraordinary_Aesthetic_Experiences
- Geertz, Clifford. "Religion as a Cultural System," in *The Interpretation of Cultures: Selected Essays*, New York: Basic Books, 1973. pp.87-125. (PDF)
- Salingaros, Nikos A. "Socio-Cultural Identity in the Age of Globalization," *New Design Ideas* 2, no.1 (2018): 5-19. (PDF)

WATCH:
- Davis, Wade. "The Wayfinders: Why Ancient Wisdom Matters in the Modern World," presented at TEDx Yellowknife 2014 (1:03min), https://youtu.be/hXDil8morH8

COMPLETE:
- **EXERCISE 2**: Each socio-cultural group has a unique set of beliefs, ideals, and customs. Each person that encounters a building brings with them their particular worldview. Likewise, each architect also carries with them their unique cultural-environmental upbringing (i.e., surroundings, education, age, gender, ethnicity, etc.). If the architect is a native of where the site is located, she might be able to create a culturally sensitive

design proposal that respects the spirit of the place. If the architect is an outsider (without insider knowledge), on the other hand, the design proposal might appear naïve, offensive, or inappropriate to the locals. As architects, how can we put aside our ethnocentric viewpoints when approaching a design problem? How could an architect sensitively design a building to provide a positive experience for both the locals (indigenous/insiders) and visitors (outsiders/foreigners)? If the architect is an outsider, how might he familiarize himself with the cultural context to design something that appears appropriate? (10 points)

3 – SPIRITUALITY IN ARCHITECTURE
(SPIRIT / KNOWLEDGE / MEANING)

KEY CONCEPTS:

Neurotheology, empathic thinking, meditation / contemplation, spiritual awakening, transcendent, numinous, sacred space, hierophany, theophany, axis-mundi, imago-mundi, self-awareness, parietal cortex, ritual-architectural event, extraordinary architectural experience (EAE), archeology of religion, ritual/rite/ceremonial occasion, socio-religious institutions

READ:

- Barrie, Tom, Julio Bermudez, Anat Geva, and Randall Teal. "Architecture, Culture & Spirituality: Creating a Forum for Scholarship and Discussion of Spirituality and Meaning in the Built Environment." ACS Forum white paper, (2007): pp.1-7. (PDF)
- Bermudez, Julio. "Amazing Grace: New Research into 'Extraordinary Architectural Experiences' Reveals the Central Role of Sacred Places," *Faith & Form: The Interfaith Journal on Religion, Art and Architecture* 42, no.2 (2009): 8-13. Available online: https://www.academia.edu/3893879/AMAZING_GRACE_New_Research_into_Extraordinary_Architectural_Experiences_Reveals_the_Central_Role_of_Sacred_Places (PDF)
- Blumberg, Lynne. "What Happens to the Brain During Spiritual Experiences?" *The Atlantic*, June 5, 2014. https://www.theatlantic.com/health/archive/2014/06/what-happens-to-brains-during-spiritual-experiences/361882/
- Jones, Lindsay. "An Expanded Morphology of Ritual-Architectural Priorities," in *The Hermeneutics of Sacred Architecture: Experience, Interpretation, Comparison*. 2 vols, Religions of the World. Cambridge, MA: Harvard University Press, 2000. 2:295-332 (PDF)

ADDITIONAL READING

- Bermudez, Julio, and Brandon Ro. "Extraordinary Architectural Experiences: Comparative Study of Three Paradigmatic Cases of Sacred Spaces, the Pantheon, the Chartres Cathedral and the Chapel of Ronchamp." In *Ambiances in Action: Proceedings of the 2nd International Congress on Ambiances*, edited by Jean-Paul Thibaud and Daniel Siret, 689-94. Canadian Centre for Architecture, Montreal, Canada: International Ambiances Network, 2012. Available online: https://www.academia.edu/3779190/Extraordinary_Architectural_Experiences_Comparative_Study_of_Three_Paradigmatic_Cases_of_Sacred_Spaces_the_Pantheon_the_Chartres_Cathedral_and_the_Chapel_of_Ronchamp

- Bermudez, Julio, et. al. “Externally-Induced Meditative States: An Exploratory fMRI Study of Architects’ Responses to Contemplative Architecture,” *Frontiers of Architectural Research* 6 (2017): 123-136. (PDF)
- Eliade, Mircea. “Sacred Space and Making the World Sacred,” in *The Sacred and the Profane; the Nature of Religion*. New York: Harcourt, 1987. Pp. 20-65 (PDF)
- Ishizu, Tomohiro, and Semir Zeki. “A Neurobiological Enquiry into the Origins of our Experience of the Sublime and Beautiful,” *Frontiers in Human Neuroscience* 8, no.891 (November 2014): 1-10. (PDF)
- Miller, Lisa, Iris M Balodis, Clayton H McClintock, Jiansong Xu, Cheryl M Lacadie, Rajita Sinha, and Marc N Potenza. "Neural Correlates of Personalized Spiritual Experiences." *Cerebral Cortex* 29, no. 6 (2019): 2331-38. (PDF)
- Short, E. Baron, et. al. “Regional Brain Activation During Meditation Shows Time and Practice Effects: An Exploratory FMRI Study,” *eCAM* 7, no.1 (2010): 121-127. (PDF)
- Wang, Danny J. J., Hengyi Rao, Marc Korczykowski, Nancy Wintering, John Pluta, Dharma Singh Khalsa, and Andrew B. Newberg. "Cerebral Blood Flow Changes Associated with Different Meditation Practices and Perceived Depth of Meditation." *Psychiatry Research: Neuroimaging* 191, no. 1 (2011): 60-67. (PDF)

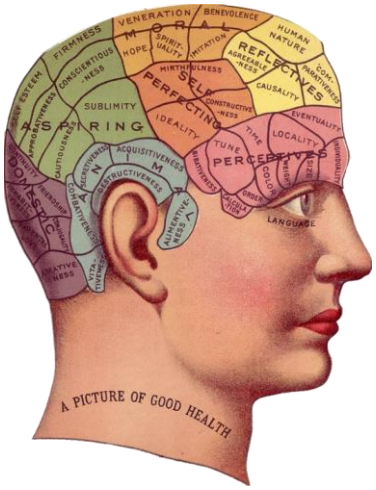
WATCH:

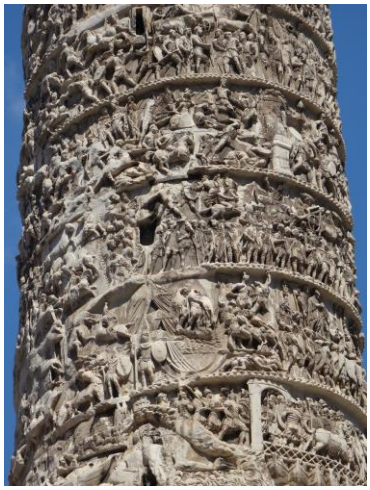
- Cox, Harvey. “The Monastery, The City, and the Human Future,” keynote lecture given at the *ACS 5 Symposium: Urbanism, Spirituality and Well-Being at Harvard University*, 2013 (48min), https://youtu.be/vHNWKPDt6_c
- Bermudez, Julio. “'Spiritualizing' Modernity and the City: The Future of Urbanism, Wellbeing and Spirituality,” lecture given at the *ACS 5 Symposium: Urbanism, Spirituality and Well-Being at Harvard University*, 2013 (28min), https://youtu.be/69xRZ6V0ZP8

COMPLETE:

- **EXERCISE 3**: Select a religious building and interpret it in terms of the messages and meanings that might be conveyed through its architectural experience. Use three or more of the ritual-architectural priorities outlined in Lindsey Jones’ framework to help with your interpretation (i.e., astronomy, sacred history, sanctuary, homology, etc). Your written interpretation should include photos, plans, diagrams to reinforce your analysis. (20 points)

4 – COGNITIVE ARCHITECTURE
(SPIRIT / KNOWLEDGE / MEANING)





KEY CONCEPTS:

Nature (biology) vs Nurture (culture), knowledge, meaning, thought, intelligence, expertise, education, experience, memories, culture, advertisement, semantic associations, context, analytical (how space looks), conscious mental processes (thinking, knowing, remembering, judging, problem solving), higher level functions (language, imagination, perception, planning, learning, memory, thought), subjective (self), frontal lobe

READ:

- Eberhard, John P. "Applying Neuroscience to Architecture," *Neuron* 62 (2009): 753-56. (PDF)
- Sussman, Ann, and Justin B. Hollander. "A New Foundation: Darwin, Biology, and Cognitive Science," in *Cognitive Architecture: Designing for How We Respond to the Built Environment*. New York: Routledge, 2015. pp. 1-9. (BOOK)
- Sussman, Ann, and Justin B. Hollander. "Storytelling is Key: We're Wired for Narrative," in *Cognitive Architecture: Designing for How We Respond to the Built Environment*. New York: Routledge, 2015. pp. 133-149. (BOOK)
- Zeisel, John. "The Brain's Environment System," in *Inquiry by Design: Environment / Behavior / Neuroscience in Architecture, Interiors, Landscape, and Planning*. New York: W.W. Norton, 2006. pp. 141-156 (PDF)

ADDITIONAL READING

- Bermudez, Julio, and Brandon Ro. "The Experience of President Lincoln's Cottage: Results of a Museum focused Post-Occupancy Evaluation Survey." *Visitor Impact Study Research Report*. Washington, DC: President Lincoln's Cottage at the Soldiers' Home, 2018. Available online: https://www.academia.edu/38469805/The_Experience_of_President_Lincoln_s_Cottage._Results_of_a_Museum_focused_Post-Occupancy_Evaluation_Survey
- Ro, Brandon, and Julio Bermudez. "Understanding Extraordinary Architectural Experiences through Content Analysis of Written Narratives." *Enquiry: A Journal of Architectural Research* 12, no. 1 (2015): 17-34. (PDF)

WATCH:

- Mallgrave, Harry Francis. "Evolution, Neuroscience and the Future of Design," lecture given at the University of Notre Dame School of Architecture on October 28, 2015 (54min), https://youtu.be/co3DK1t8Y_w

- Arbib, Michael. “Design from a Cognitive Perspective: Learning from Zumthor and Utzon,” presented at the 2017 Driehaus Foundation Built Environment Symposium (31min), https://youtu.be/rH4CPI2SXz0

COMPLETE:

- **EXERCISE 4**: Look for symmetry, curves, and complexity in a favorite landmark and/or building elevation. Do these traits show up only in plan, elevation, or both? Does the elevation have a compelling hierarchy or suggest a narrative sequence? What cultural memory, knowledge, or meaning does the architecture attempt to convey? How can understanding neuroscience and cognition help you become a better architect? Provide an image of your building to accompany your written response. (10 points)

5 – BEHAVIORAL SCIENCE FOR ARCHITECTURE
(BODY / SENSORY-MOTOR)



KEY CONCEPTS:

Sensory-motor, interaction, embodied experience, perception, cognition, social anthropology (patterns of behavior), cognitive neuroscience, learned behavior, productivity, proxemics, privacy, territoriality, personal space

READ:

- Chatterjee, Anjan, and Oshin Vartanian. "Neuroaesthetics," *Trends in Cognitive Science* 18, no.7 (July 2014): 370-375. (PDF)
- Lang, Jon T. "The Behavior Setting: A unit for Environmental Analysis and Design," in *Creating Architectural Theory: The Role of the Behavioral Sciences in Environmental Design*. New York: Van Nostrand Reinhold, 1987. (PDF)
- Lang, Jon T. "Fundamental Processes of Human Behavior," in *Creating Architectural Theory: The Role of the Behavioral Sciences in Environmental Design*. New York: Van Nostrand Reinhold, 1987. (PDF)
- Lang, Jon T. "Privacy, Territoriality and Personal Space," in *Creating Architectural Theory: The Role of the Behavioral Sciences in Environmental Design*. New York: Van Nostrand Reinhold, 1987. (PDF)

ADDITIONAL READING

- Bermudez, Julio, and Brandon Ro. "Memory, Social Interaction, and Communicability in Extraordinary Experiences of Architecture." In *The Visibility of Research: Proceedings of the 2013 ARCC Spring Research Conference, Architectural Research Centers Consortium*, edited by Chris Jarrett, Kyoung-Hee Kim and Nick Senske, 677-84. Charlotte, NC: University of North Carolina at Charlotte, 2013. Available online: https://www.academia.edu/3779035/Memory_Social_Interaction_and_Communicability_in_Extraordinary_Experiences_of_Architecture
- Lang, Jon, Charles Burnette, Walter Moleski, David Vachon, eds. *Designing for Human Behavior: Architecture and the Behavioral Sciences*. Stroudsburg, PA: Dowden, Hutchinson & Ross, 1974.
- Newman, Oscar. *Defensible Space: Crime Prevention through Urban Design*. New York: Macmillan,1972.
- Ro, Brandon. "Understanding the Impact of School Design on Academic Performance: Results of a Post-Occupancy Evaluation for Butler Elementary School." *Research Report*. VCBO Architecture: Salt Lake City, August 2017. Available online: https://www.academia.edu/35269185/Understanding_the_Impact_of_School_Design_on_Academic_Performance
- Sommer, Robert. *Personal Space: The Behavioral Basis of Design*. Englewood Cliffs, NJ: Prentice Hall, 1969.

WATCH:

- "Classical and Modern: The Power of Architectural Vocabulary on Behavior," presented at the 2019 Driehaus Foundation Built Environment Symposium (1:37min), https://youtu.be/-Ekuo3V67u8

COMPLETE:

- **EXERCISE 5**: Visit a suburban or urban center and, with camera, notebook, or mobile device in hand, observe people: where do they gather; how do they walk? Preferably draw or sketch; you tend to look at things more closely then. Where is there a specifically interesting and definable response to the built environment? Create an informal report illustrating your observations. This should include a plan diagram, photos, sketches, and a written response illustrating your findings. (20 points)

6 – ARCHITECTURE FOR THE SENSES
(BODY / SENSORY-MOTOR)

KEY CONCEPTS:

Sensory-motor, interactions, sight (occipital lobe), smell (olfactory area), tactile/haptic (parietal lobe), hearing (temporal lobe), taste, body reactions (chills, sweat, goosebumps), thermal comfort

READ:

- Pallasmaa, Juhani. "An Architecture of the Seven Senses," in Holl, Steven, Juhani Pallasmaa, and Alberto Pérez Gómez. *Questions of Perception: Phenomenology of Architecture*. New ed. San Francisco, CA: William Stout, 2006, pp.26-37. (PDF)
- Sternberg, Esther M. "Sound and Silence," in *Healing Spaces: The Science of Place and Well-Being.* Cambridge: Belknap Press, 2010. pp.53-74. (BOOK)
- Sternberg, Esther M. "Cotton Wool and Clouds of Frankincense," in *Healing Spaces: The Science of Place and Well-Being*. Cambridge: Belknap Press, 2010. pp.75-94. (BOOK)
- Tuan, Yi-Fu. "Common Traits in Perception: The Senses," in *Topophilia: A Study of Environmental Perception, Attitudes, and Values.* New York: Columbia University Press, 1990. pp.5-12. (PDF)

WATCH:

- Behling, Stefan. "Architecture and the Science of the Senses," TEDx Goodenough College, 2016 (16min) https://youtu.be/FbfPWalO_ss
- Pallasmaa, Juhani. "Architecture as Experience—Existential Fusion of the World and Self," keynote presentation at the 2017 Driehaus Foundation Built Environment Symposium (52min), https://youtu.be/HyJbWdQ_hvA
- Treasure, Julian. "Why Architects Need to Use Their Ears," presented at TED Global conference (10min), https://youtu.be/y5nbWUOc9tY

COMPLETE:

- **EXERCISE 6:** Go on a hike in the mountains, visit a forest, or walk through a botanical garden. Take note of all your sense modalities as you experience the natural setting. What sounds do you hear? What do you smell? What colors do you see? What textures do you feel? Speculate on how one might create a multi-sensory experience in architecture. What design features can enhance your proposal? Include a selfie photo of yourself at the site in your reflection. (10 points)

7 – EMOTION IN ARCHITECTURE
(MIND / EMOTION / VALUATION)

KEY CONCEPTS:

Emotion-valuation, feelings, reward pathways, contemplation, nature (biology), subcortical brain (amygdala, ventral striatum, hypothalamus), temporal lobe, stress (hypothalamus), fear (amygdala), reward center (ventral striatum), emotional processing (amygdala)

READ:

- Fich, Lars Brorson, Peter Jönsson, Poul Henning Kirkegaard, Mattias Wallergård, Anne Helene Garde, and Åse Hansen. "Can Architectural Design Alter the Physiological Reaction to Psychosocial Stress? A Virtual Tsst Experiment." *Physiology & Behavior* 135 (2014): 91-97. (PDF)
- Salingaros, Nikos A. "Fractal Art and Architecture Reduce Physiological Stress," *Journal of Biourbanism*, no. 2 (2012): 11-28. (PDF)
- Salingaros, Nikos A. "The Laws of Architecture from a Physicist's Perspective," in *A Theory of Architecture*, Portland: Sustasis Press, 2013. pp.27-44. Available online: https://zeta.math.utsa.edu/~yxk833/ATOA-online.html (PDF)

ADDITIONAL READING

- Lutz, Catherine, and Geoffrey M. White. "The Anthropology of Emotions," *Annual Review of Anthropology* 15 (1986): 405-436. (PDF)

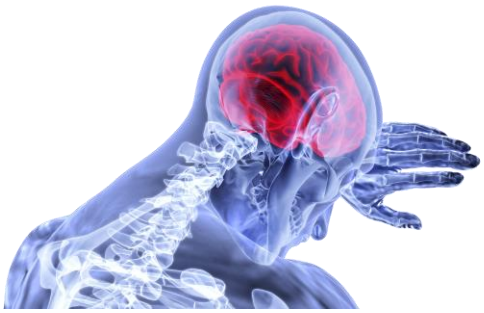
WATCH:

- Robinson, Sarah. "The Space of Relation: Emotion in Architectural Experience," presented at the 2017 Driehaus Foundation Built Environment Symposium (27min), https://youtu.be/wb4UXzpp_ks

COMPLETE:

- **EXERCISE 7:** People evolved to see other people. We perceive significantly more information as we come closer to another person, the approach has increasing psychological impact. Find a building designed to do the same thing. Record your responses—visual and emotional. As a contrast, find a building that presents as a blank face and portrays less information the closer you get: record its impact on your emotions and state of mind. In a word document include a photo of each building, its name, location, etc. as well as a written paragraph about your emotional response to each building. (20 points)

8 – PSYCHOLOGICAL DIMENSIONS OF ARCHITECTURE
(MIND / EMOTION / VALUATION)


KEY CONCEPTS:

Color psychology, color effect on mood, scale of human perception, spatial psychology, institutional arrangements (prisons, mental hospitals), sociopetal/sociofugal, panopticon

READ:

- Cherulnik, Paul D. "Sociopetal Space in Psychiatric Hospitals," in *Applications of Environment- Behavior Research: Case Studies and Analysis*, Cambridge: Cambridge University Press, 1993. pp.131-152. (PDF)
- Coburn, Alexander, Oshin Vartanian, Yoed N. Kenett, Marcos Nadal, Franziska Hartung, Gregor Hayn-Leichsenring, Gorka Navarrete, José L. González-Mora, and Anjan Chatterjee. "Psychological and Neural Responses to Architectural Interiors." *Cortex* 126 (2020): 217-41. (PDF)
- Sternberg, Esther M. "Seeing and Healing," in *Healing Spaces: The Science of Place and Well-Being.* Cambridge: Belknap Press, 2010. pp.25-52. (BOOK)
- Tuan, Yi-Fu. "Common Psychological Structures and Responses," in *Topophilia: A Study of Environmental Perception, Attitudes, and Values*. New York: Columbia University Press, 1990. pp.13-29. (PDF)

ADDITIONAL READING

- Cherulnik, Paul D. "Defensible-Space Modifications at Clason Point Gardens," in *Applications of Environment- Behavior Research: Case Studies and Analysis*, Cambridge: Cambridge University Press, 1993. pp.197-220. (PDF)
- Ro, Brandon. "Evaluating Quality Learning Environments: Results of a Post-Occupancy Evaluation for Odyssey Elementary School." *Research Report*. VCBO Architecture: Salt Lake City, December 2015. Available online: https://www.academia.edu/19696710/Evaluating_Quality_Learning_Environments_Results_of_a_Post-Occupancy_Evaluation_for_Odyssey_Elementary_School

WATCH:

- "How Architecture Affects Human Behavior," (8min) https://youtu.be/zSgrVYc6AW0
- Jeffery, Kate. "Behavior and Architecture," presented at *Sensing Space - Behavioural Science for The Built Environment, Conscious Cities Festival 2018*, (10min) https://youtu.be/T8I6ze-deo8
- Wyatt, Scott. "Cubicles Don't Work: How Architectural Design Affects your Brain," TEDx Seattle, 2017 (15min), https://youtu.be/lFkJCpD0_V0
- Sussman, Ann. "Modern Architecture: A Direct Expression of Trauma of WWI Trench," presented at the 2020 Academy of Neuroscience for Architecture conference, (10min) https://youtu.be/T13cAmFcHHc

COMPLETE:

- **EXERCISE 8:** With a partner, create a study guide for the midterm exam based on key concepts covered in the readings, lectures, and videos. Upload your notes for credit (10 points).

9 – EDGES: THIGMOTAXIS IN ARCHITECTURE
(AESTHETIC EXPERIENCE)


KEY CONCEPTS:

Thigmotaxis, maze, labyrinth, spatial navigation, relaxation/stress, people watching, Jane Jacobs, effect of highways on human behavior, building orientation, Christopher Alexander, A Pattern Language, Main Street Disneyland, bipedal, ambulation person, hippocampus, paleomammallian brain, wall-following/hugging, figure-ground drawings, walking paths/nodes, prospect/refuge, double-loaded corridors vs. single-loaded, windows on the street

READ:

- Lizier, Daniele S., Reginaldo Silva-Filho, Juliane Umada, Romualdo Melo, and Afonso Carlos Neves. "Effects of Reflective Labyrinth Walking Assessed Using a Questionnaire." *Medicines* 5, no. 111 (2018): 1-11. (PDF)
- Sternberg, Esther M. "Mazes and Labyrinths," in *Healing Spaces: The Science of Place and Well-Being*. Cambridge: Belknap Press, 2010. pp.95-124. (BOOK)
- Sussman, Ann, and Justin B. Hollander. "Edges Matter: Thigmotaxis (the 'Wall-hugging' Trait)," in *Cognitive Architecture: Designing for How We Respond to the Built Environment*. New York: Routledge, 2015. Pp. 10-55. (BOOK)

ADDITIONAL READING

- Buras, Nir. "Le Corbusier, CIAM, Brasilia, and Pruitt-Igoe," in Chapter 1, *The Art of Classic Planning: Building Beautiful and Enduring Communities*. Boston: Harvard University Press, 2020. pp.18-31. (PDF)

WATCH:

- Burden, Amanda. "How Public Spaces Make Cities Work," 2014 TED talk at Vancouver, British Columbia (18min), https://youtu.be/j7fRIGphgtk
- Ellard, Colin. "The Psychology of Architectural and Urban Design: Sensor-based Field Methods Based on Guided Walks," presented at the 2014 Academy of Neuroscience for Architecture, (15min) https://youtu.be/ClTeJror1sQ
- "Re:Thinking How We Design Haiti's Urban Landscape with Dr. Nir Buras," interview as part of the 2020 #She_Builds The Future Festival (23min), https://youtu.be/BI83qdc0NYk

COMPLETE:

- **Exercise 9**: In the drawings, sketches, or photographs taken of urban or suburban areas for Exercise 5, where can you hypothesize thigmotaxis may be at work? Virtually visit (via Google Earth) a different urban plaza in another city (e.g., Spanish Steps in Rome, Washington Square in New York, Hyde Park in London, Piazza San Marco in Venice, Tiananmen Square in Beijing). Observe where people are located. Where is thigmotaxis at work in this new location? How does this align with your previous hypothesis? Provide an image reinforcing your interpretation and findings. (10 points)

10 – PATTERNS: FACES AND SPACES
(AESTHETIC EXPERIENCE)



KEY CONCEPTS:

Facial recognition, spatial recognition, approach-avoidance, enclosure-openness, spatial volume, anthropomorphic, prospect/refuge, role of vision, perception, fMRI, FFA, Thatcher effect, pareidolia, visual thresholds, emotional field of vision, social field of vision, sensory threshold distance, golden rectangle

READ:

- Sussman, Ann, and Justin B. Hollander. "Patterns Matter: Faces and Spaces," in *Cognitive Architecture: Designing for How We Respond to the Built Environment*. New York: Routledge, 2015. Pp. 56-106. (BOOK)
- Vartanian, Oshin, Gorka Navarrete, Anjan Chatterjee, Lars Brorson Fich, Jose Luis Gonzalez-Mora, Helmut Leder, Cristián Modroño, Marcos Nadal, Nicolai Rostrup, and Martin Skov. "Architectural Design and the Brain: Effects of Ceiling Height and Perceived Enclosure on Beauty Judgments and Approach-Avoidance Decisions." *Journal of Environmental Psychology* 41 (2015): 10-18. (PDF)
- Salingaros, Nikos A. "Life and Complexity in Architecture from a dynamic Analogy," in *A Theory of Architecture*, Portland: Sustasis Press, 2013. pp.105-128. Available online: https://zeta.math.utsa.edu/~yxk833/ATOA-online.html (PDF)

WATCH:

- Gehl, Jan. "In Search of the Human Scale," presented at TEDx KEA (2015), (21min) https://youtu.be/Cgw9oHDfJ4k
- Mintzer, Mara. "We Let Kids Design Our City - Here's What Happened," presented at TEDx MileHigh 2018 (14min), https://youtu.be/9cudn_vSdCY
- Montgomery, Charles. "The Happy City Experiment," presented at TEDx Vancouver 2014 (19min), https://youtu.be/7WiQUzOnA5w
- Speck, Jeff. "4 Ways to Make a City More Walkable," presented at TEDx 2017 (18min), https://youtu.be/6cL5Nud8d7w

COMPLETE:

- **EXERCISE 10**: Go to a popular town or city square; get a map or create a figure-ground drawing of the area; is the square within the 'social field of vision' or outside it? Visit a shopping center or mall and explore how the more intimate visual thresholds mentioned by Sussman and Hollander are at work in the store or restaurant plans and their interior layouts. Provide diagrams and/or plans to accompany your written response. (20 points)

11 – SHAPES: SYMMETRY, HIERARCHY, CURVES, COMPLEXITY
(AESTHETIC EXPERIENCE)


KEY CONCEPTS:

Fractals, mirror symmetry, rotational symmetry, biometric data, bilateral symmetry, asymmetry, hierarchy, minimalism, order vs. complexity, harmony, ornament, anthropomorphic attributes of building elements, Vitruvian man, biological advantages of symmetry, beauty, sharp lines/edges vs. curves, curve bias

READ:

- Hollander, Justin B., and Ann Sussman, Alex Purdy Levering, Cara Foster-Karim. "Using Eye-Tracking to Understand Human Responses to Traditional Neighborhood Designs," *Planning Practice & Research*, 35 no.5 (2020), 485-509. (PDF)
- Salingaros, Nikos A. and Ann Sussman. "Biometric Pilot-Studies Reveal the Arrangement and Shape of Windows on a Traditional Façade to be Implicitly 'Engaging', Whereas Contemporary Facades are Not," *Urban Science* 4, no.26 (2020): 1-18.
- Sussman, Ann, and Justin B. Hollander. "Shapes Carry Weight: Bilateral Symmetry, (Hierarchy), Curves, and Complexity," in *Cognitive Architecture: Designing for How We Respond to the Built Environment*. New York: Routledge, 2015. Pp. 107-132. (BOOK)

ADDITIONAL READING

- Salingaros, Nikos A. "Symmetry gives Meaning to Architecture," *Symmetry: Culture and Science* 31, no.3 (2020): 231-260. (PDF)

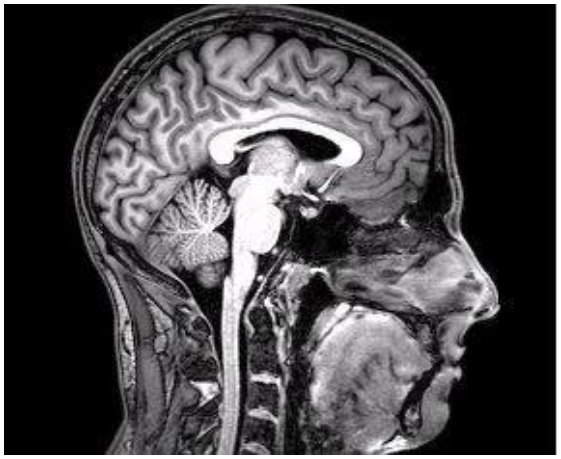
WATCH:

- McNicholas, Matthew. "Ornament is Indispensable: The Impact of Fractal Detail on the Mind," 2014 Classical Tradition Conference, Salt Lake City (19min), https://youtu.be/lN-Rdw8dvG8
- Jeffery, Kate. "Cognitive Neuroscience and Architecture," presented at the Conscious Cities Festival 2018 (23min), https://youtu.be/WGgbfiQJS4Y

COMPLETE:

- **EXERCISE 11:** Trinity Church in Boston (see Sussman/Hollander, Figure 4.3) has elaborate elevations that draw visitors' attention and seem to engage viewers more than any of the neighboring structures viewed in the photograph. Analyze why this may be the case using the concepts presented by Sussman and Hollander. (10 points)

12 – BEAUTY AND THE BRAIN
(HEALTH + WELL-BEING)



KEY CONCEPTS:

Neuroaesthetics, aesthetics, beauty, eye of the beholder vs. brain of the beholder, medial orbito-frontal cortex (mOFC-A1), functional magnetic resonance imaging (fMRI), perception, apprehension, comprehension, subjective / objective, holism, beauty scale

READ:

- Buras, Nir. “Beauty and Holism / Perception and Beauty / Perception is Fractal / Fractal is Classical / Phenomenological Confirmation / Fractal is Classic Urban / The Beauty Scale” in Chapter 6, *The Art of Classic Planning: Building Beautiful and Enduring Communities*. Boston: Harvard University Press, 2020. pp.148-165. (PDF)
- Coburn, Alex, Oshin Vartanian, and Anjan Chatterjee. "Buildings, Beauty, and the Brain: A Neuroscience of Architectural Experience." *Journal of Cognitive Neuroscience*, no. 9 (2017): 1521-1531. (PDF)
- Pak, Faith A., and Ethan B. Reichsman. "Beauty and the Brain: The Emerging Field of Neuroaesthetics." *The Harvard Crimson* (2017), accessed January 1, 2021, https://www.thecrimson.com/article/2017/11/10/neuroaesthetics-cover/
- Reisner, Yael, and Semir Zeki. "Beauty in Architecture: Not a Luxury - Only a Necessity." *Architectural Design*, no. 5 (2019): 14-19. (PDF)

ADDITIONAL READING

- Jacobs, Richard H.A.H., Remco Renken, Frans W. Cornelissen. “Neural Correlates of Visual Aesthetics: Beauty as the Coalescence of Stimulus and Internal State,” *PLoS ONE* 7, no.2 (February 2012): e31248. (PDF)
- Jacobsen, Thomas, Ricarda I. Schubotz, Lea Höfel, and D. Yves v Cramon. "Brain Correlates of Aesthetic Judgment of Beauty." *NeuroImage* 29, no. 1 (2006): 276-85. (PDF)
- Pearce, Marcus T., et. al. “Neuroaesthetics: The Cognitive Neuroscience of Aesthetic Experience,” Perspectives on Psychological Science 11, no.2 (2016): 265-279. (PDF)
- Tomohiro, Ishizu, and Zeki Semir. "Toward a Brain-Based Theory of Beauty." *PLoS ONE* 6, no. 7 (2011): e21852-e52.
- Zeki, Semir, John Paul Romaya, Dionigi M. T. Benincasa, and Michael F. Atiyah. “The Experience of Mathematical Beauty and its Neural Correlates,” *Frontiers in Human Neuroscience* 8, no.68 (2014): 1-12. (PDF)
- Zeki, Semir, Oliver Y. Chen, and John Paul Romaya. “The Biological Basis of Mathematical Beauty,” *Frontiers in Human Neuroscience* 12, no.467 (2018): 1-8. (PDF)

WATCH:

- Aguirre, Claudia. “What Neuroscience Teaches us about Beauty,” presented at the 2016 Global Wellness Summit, Tyrol, (15min) https://youtu.be/mKdyYc1jAQA
- Chatterjee, Anjan. “Buildings, Beauty and the Brain: A Neuroscience of Architectural Experience,” presented at the 2018 Global Wellness Summit in Cesena, Italy, (14min) https://youtu.be/CPJ4fhPov5s
- Dutton, Denis. “A Darwinian Theory of Beauty,” TED talk Long Beach, California 2010, (15min) https://youtu.be/PktUzdnBqWI
- Zeki, Semir. “The Neurobiology of Beauty,” TEDx UCL 2012 (13min), https://youtu.be/NlzanAw0RP4

COMPLETE:

- **EXERCISE 12**: Select a classical building of your choice and analyze its level of architectural beauty. Create a proportional diagram similar to that found in the Buras reading that illustrates the fractal relationships between different classical elements. This is best seen in the elevations of a building since humans visually perceive the façade rather than the haptic experience of a floor plan. Submit a PDF of your diagram with the name of the building to Canvas for credit (10 points).

13 – DESIGNING WITH BIOPHILIA & BIOMIMICRY
(HEALTH + WELL-BEING)


KEY CONCEPTS:

Biophilia, biomimicry, biophobia, healing gardens, savanna preference, prospect/refuge, placelessness, spirit of place, green building movement, sustainability, monastic gardens, stress reduction, light and space, place-based relationships, sensory variability, natural shapes/forms, connections to nature

READ:

- Kaplan, Stephen. "The Restorative Benefits of Nature: Toward an Integrative Framework." *Journal of Environmental Psychology* 15, no. 3 (1995): 169-82. (PDF)
- Sternberg, Esther M. "Healing Gardens and my Place of Peace," in *Healing Spaces: The Science of Place and Well-Being*. Cambridge: Belknap Press, 2010. pp.280-296. (BOOK)
- Sussman, Ann, and Justin B. Hollander. "Nature is our Context: Biophilia and Biophilic Design," in *Cognitive Architecture: Designing for How We Respond to the Built Environment*. New York: Routledge, 2015. Pp. 150-163. (BOOK)
- Van den Berg, Agnes E., Yannick Joye, and Sander L. Koole. "Why Viewing Nature Is More Fascinating and Restorative Than Viewing Buildings: A Closer Look at Perceived Complexity." *Urban Forestry & Urban Greening* 20 (2016): 397-401. (PDF)

ADDITIONAL READING

- Donovan, Geoffrey H., and Jeffrey P. Prestemon. "The Effect of Trees on Crime in Portland, Oregon," *Environment and Behavior* 44, no.1 (2012): 3-30. (PDF)
- Salingaros, Nikos A. "The Biophilic Healing Index Predicts Effects of the Built Environment on Our Wellbeing," Journal of Biourbanism 8, no.1 (2019): 13-34. (PDF)
- Sussman, Ann. "Empathy in Design: Measuring the Impact of Biophilia," The Genetics of Design (2020). Available online: https://geneticsofdesign.com/2020/05/26/empathetic-design-measuring-the-impact-of-biophilia/ (PDF)

WATCH:

- Logan, Allan. "Nature as a Promoter of Well-Being in Future Cities," lecture given at the *ACS 5 Symposium: Urbanism, Spirituality and Well-Being at Harvard University,* 2013 (28min), https://youtu.be/z5SAA2_j-5g
- Sturgeon, Amanda. "Using Biophilic Design to Heal Body, Mind, and Soul," TEDmed talk 2019 (14min), https://youtu.be/uAmbZCtNC9U

COMPLETE:

- **EXERCISE 13**: Select a favorite building or urban plan and analyze it in terms of the four principles articulated by Sussman and Hollander in their book *Cognitive Architecture* which aims to describe human experience in the built environment. This includes the following principles: 1) Edges Matter, 2) Patterns Matter, 3) Shapes Carry Weight, and 4) Storytelling is Key. Provide photographs, sketches, and diagrams to illustrate your written analysis for each of the four principles. Also, reflect on the following questions: How is this approach of analysis useful? Could it be improved? What does it overlook? (20 points)

14 – HEALING SPACES
(HEALTH + WELL-BEING)


KEY CONCEPTS:

Environmental impacts on healing, recovery time, emotional well-being, physiological well-being, cognitive well-being, human health, nature vs. built environment, holistic health, meditation, comptemplative spaces

READ:

- Evans, Gary W., and Janetta Mitchell McCoy. "When Buildings Don't Work: The Role of Architecture in Human Health." *Journal of Environmental Psychology* 18, no. 1 (1998): 85-94. (PDF)
- Foote, Frederick O., and Lora Schwartz. "Holism at the National Intrepid Center of Excellence (Nicoe)." *EXPLORE* 8, no. 5 (2012): 282-90. (PDF)
- Salingaros, Nikos A. *Biophilia & Healing Environments: Healthy Principles for Designing the Built World*. New York: Terrapin Bright Green, 2015. (PDF)
- Sternberg, Esther M. "Healing Places," in *Healing Spaces: The Science of Place and Well-Being.* Cambridge: Belknap Press, 2009. pp.1-24 (BOOK)

WATCH:

- Ruggles, Don. "Beauty, Neuroscience and Architecture: Timeless Patterns and Their Impact on Our Well-Being," presented at the 2019 Design and Tech Connection, New York, (51min) https://youtu.be/x3dCXhGPPA4
- Sternberg, Esther. "Healing Spaces: The Science of Place and Well-Being," TEDx Tucson, 2013 (17min). https://youtu.be/7zBOPRs1yRE

COMPLETE:

- **EXERCISE 14:** In an effort to reduce your own stress as the semester comes to an end, use your knowledge about healing spaces. Visit a place or space that allows for contemplation and meditation. Sit quietly for several minutes taking in your surroundings. Attempt to enter a meditative or contemplative state. Stay in the space for at least 30 minutes. Where did you go? How does this place or space promote health and well-being? What senses were engaged in your aesthetic experience? What emotions did you experience in the space or place? Did your perceived level of stress increase, decrease, stay the same? In a narrative format, describe your experience and how it affected you by answering the above questions. (10 points).
- **EXERCISE 15:** With a partner, create a study guide for the final exam based on key concepts covered in the readings, lectures, and videos. Upload your notes for credit (10 points).