BIBB 470
Animal Models of Neuropsychiatric Disorders
Fall 2019
MW 2:00-3:20 PM

Course Faculty
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Office Hours: Tuesdays 3:00-4:00 pm or by appointment

Synopsis:
This seminar will focus on the significant role that animal models play in understanding the pathophysiology of and development of treatment options in human neuropsychiatric disorders. The course will focus on the use of genetically modified mice in the investigation of Autistic Spectrum Disorders (ASDs) and Developmental Disabilities, anxiety and affective disorders, schizophrenia, and obsessive-compulsive disorder (OCD). Class time will consist of student-led, journal article presentations and discussions. Emphasis will be placed on the critical analysis of primary literature with a focus on understanding the limitations of the models under study. Students will be required to orally present journal articles from the primary literature, participate in article discussions, write peer-reviews of article presentations, and write a final, "News and Views"-style paper.

Specific Learning Objectives:

By the end of the course, students will:

- Understand how animal models contribute to the understanding of psychiatric disorders in humans and recognize the limitations of such models
- Identify the three criteria of validity that have been proposed for animal models of human disease
- Acquire the skills needed to evaluate, critique, and present primary research articles from leading academic journals

Pre-Requisites
BIBB 109 / PSYC 109 / BIOL 109: Introduction to Brain and Behavior is a ***pre-requisite*** for the course. The course will assume that students have a basic background in neuroscience and genetics.

Canvas
https://courseweb.library.upenn.edu/
Lecture slides, course materials, and announcements will be posted on this site.

Course Structure:
The course is broken down into **5 Topic-focused Modules**:

1) **Module 1**: An introduction to the laboratory mouse with an emphasis on mouse genetics, behavioral testing, and the theory behind mouse models of psychiatric

disorders. This module will also include an introduction to Research Methods, including the use (and misuse) of p-values, the concept of replicability, and the process of peer review.

2) **Module 2**: Mouse models of Autistic Spectrum Disorders (ASDs) and Development Disabilities
3) **Module 3**: Mouse models of Obsessive-Compulsive Disorder (OCD)
4) **Module 4:** Mouse models of Schizophrenia
5) **Module 5**: Mouse models of Anxiety and Affective Disorders (Depression and Bipolar Disorder)

Weekly Readings:

The assigned papers are to be read ***prior to class***. All reading material will be posted on the Canvas site. You must complete the assigned readings so that you are well-prepared for the discussions during class. Please do **all** of the required readings as they are assigned.

Grading:

Your final grade in the course will be determined as follows:

1. **Attendance and Participation:** 25%
2. **Peer Reviews (4):** 10%
3. **Validity Evaluations (4):** 10%
4. **Oral Presentations (2):** 40% total (20% each)
5. **News and Views Article:** 15%

Attendance and Participation Policy:

25% of your grade will come from Attendance and Participation. Attendance is **required** for this course. Anyone who misses **more than three class periods** because of unexcused absences will automatically fail the course. For each class period, you may earn up to three points for Attendance and Participation; one point will be earned automatically for showing up to class; two additional points can be earned for participating in the paper discussions. I am interested in questions that show you read the paper with a critical eye. Simply asking a question that requires a regurgitation of facts from the paper is not enough to warrant full credit.

Peer Reviews:

One of the requirements for this course (10% of total grade) is to complete **four** peer reviews of your fellow classmates' presentations. These reviews are to be thorough (~1-2 pages in length—see example provided in Canvas) and should provide significant feedback on the nature and quality of the presentation.

Peer reviews of student presentations will be due by **Sunday at 11:59 pm following the class period of the presentation**. I will provide a template in which to complete the assignment.

Weekly Validity Evaluations

One of the requirements for this course (10% of total grade) is to complete **four** validity evaluation assignments (~half a page to one page in length, single-spaced). The instructions for these assignments are at the end of the syllabus. You are required to complete **one of these assignments each week** during the weeks of paper discussion (on one of the two papers being presented). For the two weeks that you are presenting, you **do not submit** an evaluation. Your evaluation will be on one of the ***original research***

articles assigned during the week (***not a review paper***). These assignments are due by 1:29 pm on Thursday of each week. Assignments turned in after the Thursday 1:29 pm deadline will be considered **late** and will **not** be graded for credit.

Oral Pesentations:

A majority of the course will consist of student presentations of primary research articles from the biomedical literature. Each paper will be divided into **two parts**, with each part delivered by a **different student**: 1) Introduction and the first half of the Results (with the associated Methods for those Results); and 2) second half of the Results (with the associated Methods for those Results) and Discussion. You are only responsible for presenting the figures in the print version of the paper; **you are** NOT **responsible for presenting supplementary data.** However, you should understand the relevance of the supplementary data to the paper. Each section of the paper will be presented in ~20-25 minutes, for a total of 40-50 minutes per paper. THOUGH YOU ARE ONLY PRESENTING HALF OF THE PAPER, YOU ARE RESPONSIBLE FOR KNOWING ALL OF INFORMATION WITHIN THE ENTIRE PAPER. There will then be a 20-30 minute discussion following the paper presentation during which all students are free to participate (to earn discussion points).

During the semester, each student will be *required* to do **two** presentations: one First Half (Introduction and the first half of the Results with the associated Methods) and one Second Half (second half of the Results with the associated Methods and Discussion). For papers with odd numbers of figures, the two presenters will split the middle figure accordingly. You will do one presentation from presentations 1-20 and one presentation from presentations 21-40 (see matrix for details). You will be graded separately for each of the two presentations.

"News and Views" Assignment

For the one of the papers that you present, you will write an ~1000 word (two to three pages, single-spaced) "News and Views" article in the spirit of the journal *Nature*. The details of the assignment are described later in the syllabus.

Weekly Assignments

Weeks 3-5: You are required to participate in the discussion.

Weeks 6-16: Each week you will complete one of the following (see Assignment Matrix at the end of the syllabus):

1) Submit a peer review of a student presentation (instructions and template provided); or
2) Present a paper; or
3) Complete a "Validity Evaluation" of ***one*** of the two weekly papers.

Keep in mind that you must participate in the paper discussions during each of these class periods as well.

Office Hours/Email Policy:

You are encouraged to attend office hours if you have any questions about the content or structure of the course. Please only e-mail me if you have a question that can be answered

in a few sentences or less. If you have a question that requires a longer response, please come to my office hours.

Academic Integrity:
Please note that Penn has strict rules on academic integrity (see www.upenn.edu/academicintegrity). Any violation of the rules will be reported to the Office of Student Conduct and will likely result in automatic failure of the course.

Course Absence Report:
The Course Absence Report (CAR) system has been designed to provide a consistent way for students to notify course instructors of short-term absences for one or more courses. It also provides a method for advising offices to track absences and coordinate support for students who miss classes. The submission of a CAR does not excuse you from your course obligations; students are still responsible for following up with each instructor directly and adhering to course policies and procedures as outlined in the course syllabus. All students enrolled in a class can submit a CAR during the current term using Penn InTouch.

All notifications of class absences must be sent to the instructor through the CAR *only*.
If you will be absent for more than five days as a result of a University-approved excuse, please contact a CaseNet advisor with the College Office, who will notify your instructors directly.

Classroom Etiquette:
Cell phones/Smartphones should be turned off during class. Laptop computers should be used **only** for taking notes, not for sending instant messages, surfing the web, monitoring status updates on Facebook, or any other purpose.

Week	***DATE***	***Lecture Topic***	***Readings***	***Assignments Due***
1	8/28	Course Introduction	*Festing and Fisher, 2000; Boguski, 2002; Nature House Mouse Timeline; Perrin, 2014*	
2	9/2 9/4	NO CLASS THIS WEEK		
3	9/9 9/11	Genetically Modified Mice Mouse Behavioral Testing	Beglopoulos and Shen, 2004; *Pearson, 2002; Ledford, 2015; Optogenetics Primer* *Crawley, 2008; McIlwain et al., 2001; Van der Staay et al., 2001;*	Week 3 Paper Preference Selection Due
4	9/16 9/18	Mouse Models of Psychiatric Disorders	*Sluyter et al., 2014; Nestler and Hyman, 2010;* *Kaiser and Feng, 2015*	Week 4
5	9/23 9/25	Peer Review, Hypothesis Testing, Reproducibility; My Presentation	*Peer Review, P-value, and Reproducibility Papers;* *Kane et al., 2012* (Shameless Self-promotion)	Week 5
6	9/30 10/2	**ASD Models** Student Presentations (1 and 2) Student Presentations (3 and 4)	***Reviews: Servadio et al., 2015; Silverman et al., 2010*** *Peca et al., 2011 (1A, 1B)* Krueger et al., 2012 *(2A, 2B)*	Week 6
7	10/7 10/9	Student Presentations (5 and 6) Student Presentations (7 and 8)	Won et al., 2012 *(3A, 3B)* *Schmeisser et al., 2012 (4A, 4B)*	Week 7

8	10/14 10/16	Student Presentations (9 and 10) Student Presentations (11 and 12)	*Jamain et al., 2008 (5A, 5B)* *Etherton et al., 2009 (6A, 6B)*	Week 8
9	10/21 10/23	**OCD Models** Student Presentation (13 and 14) Student Presentation (15 and 16)	***Review: Ahmari, 2016*** *Welch et al., 2007 (7A, 7B)* *Angoa-Perez et al., 2012 (8A, 8B)*	Week 9
10	10/28 10/30	Student Presentations (17 and 18) Student Presentations (19 and 20)	*Shmelkov et al., 2010 (9A, 9B)* Ahmari et al., 2013 (10A, 10B)	Week 10
11	11/4 11/6	**Schizophrenia Models** Student Presentations (21 and 22) Student Presentations (23 and 24)	***Review: O'Tuathaigh et al., 2013*** *Mohn et al., 1999 (11A, 11B)* *Hikida et al., 2007 (12A, 12B)*	Week 11
12	11/11 11/13	Student Presentations (25 and 26) Student Presentations (27 and 28)	*Kvajo et al., 2008 (13A, 13B)* *Savonenko et al., 2008 (14A, 14B)*	Week 12
13	11/18 11/20	**Affective Disorders and Anxiety Models** Student Presentations (29 and 30) Student Presentations (31 and 32)	***Reviews: Berton et al., 2012;*** Boyle *et al., 2005 (15A, 15B)* *El Yacoubi et al, 2003 (16A, 16B)*	Week 13

14	11/25 11/27	Student Presentations (33 and 34) NO CLASS	*Han et al., 2013 (Figs 1-4, 6); (17A, 17B)*	Week 14
15	12/2 12/4	Student Presentations (35 and 36) Student Presentations (37 and 38)	*Roybal et al., 2007 (18A, 18B)* Landgraf et al., 2013 *(Figs 1&2 and 3-5) (19A, 19B)*	Week 15
16	12/9	Student Presentations (39 and 40)	Gross et al., 2002 (20A, 20B)	Week 16 NEWS AND VIEWS DUE

VALIDITY EVALUATIONS

- Identify the construct, face and predictive applied to the model.
- State evidence for and against the validity of the model in the context of the validator(s) used.
- State your opinion on how the model could be improved with respect to each aspect of validity.

NEWS AND VIEWS ASSIGNMENT

News and Views articles are brief and aim to introduce a scientist to significant new research in other fields. The goal of this assignment is to write an article about a specific topic that can be understood by a general scientific audience (e.g., one of your classmates); what you write needs to avoid specialized technical jargon. The basic template of an article is as follows:

Title: A short, snappy and relevant title to get the reader's attention.

Statement of the News: 1-2 sentences and ≤20 words

- summarizes the major finding(s) of the paper by emphasizing its relevance and impact on the field.

Opening paragraph geared to non-expert that:

- Briefly states motivation for the paper (1-2 sentences)
- Explicitly cites the study and topic
- States primary finding
- Briefly summarizes the implications

Paragraph(s) on background

Paragraph(s) on method (avoid being too technical)

Paragraph(s) on results

Final paragraph on the significance/implications of the work and future research directions

References: at least **5** (one can be the paper you are presenting)

One figures (one created by you that captures the relevance/significance of the paper) with a caption written by you.

A total length of ~1000 words (1200 max).

Reference List (Review Papers are in Bold)

Ahmari SE. Using mice to model Obsessive Compulsive Disorder: From genes to circuits. Neuroscience. 2016 May 3;321:121-37.

Ahmari SE, Spellman T, Douglass NL, Kheirbek MA, Simpson HB, Deisseroth K, Gordon JA, Hen R. Repeated cortico-striatal stimulation generates persistent OCD-like behavior. Science. 2013 Jun 7;340(6137):1234-9.

Angoa-Pérez M, Kane MJ, Briggs DI, Sykes CE, Shah MM, Francescutti DM, Rosenberg DR, Thomas DM, Kuhn DM. Genetic depletion of brain 5HT reveals a common molecular pathway mediating compulsivity and impulsivity. J Neurochem. 2012 Jun;121(6):974-84.

Arguello PA, Gogos JA. Modeling madness in mice: one piece at a time. Neuron. 2006 Oct 5;52(1):179-96.

Beglopoulos V, Shen J. Gene-targeting technologies for the study of neurological disorders. Neuromolecular Med. 2004;6(1):13-30.

Berton O, Hahn CG, Thase ME. Are we getting closer to valid translational models for major depression? Science. 2012 Oct 5;338(6103):75-9.

Boguski MS. Comparative genomics: the mouse that roared. Nature. 2002 Dec 5; 420(6915):515-6.

Boyle MP, Brewer JA, Funatsu M, Wozniak DF, Tsien JZ, Izumi Y, Muglia LJ. Acquired deficit of forebrain glucocorticoid receptor produces depression-like changes in adrenal axis regulation and behavior. Proc Natl Acad Sci U S A. 2005 Jan 11;102(2):473-8. Epub 2004 Dec 27.

Crawley JN. Behavioral phenotyping strategies for mutant mice. Neuron. 2008 Mar 27;57(6):809-18.

Csiszar A. Peer review: Troubled from the start. Nature. 2016 Apr 21; 532(7599):306-8.

El Yacoubi M, Bouali S, Popa D, Naudon L, Leroux-Nicollet I, Hamon M, Costentin J, Adrien J, Vaugeois JM. Behavioral, neurochemical, and electrophysiological characterization of a genetic mouse model of depression. Proc Natl Acad Sci U S A. 2003 May 13;100 (10):6227-32.

Etherton MR, Blaiss CA, Powell CM, Südhof TC. Mouse neurexin-1alpha deletion causes correlated electrophysiological and behavioral changes consistent with cognitive impairments. Proc Natl Acad Sci U S A. 2009 Oct 20;106(42):17998-8003.

Ferguson C, Marcus A, Oransky I. Publishing: The peer-review scam. Nature. 2014 Nov 27;515(7528):480-2.

Festing MF, Fisher EM. Mighty mice. Nature. 2000 Apr 20;404(6780):815.

Gross C, Zhuang X, Stark K, Ramboz S, Oosting R, Kirby L, Santarelli L, Beck S, Hen R. Serotonin1A receptor acts during development to establish normal anxiety-like behaviour in the adult. Nature. 2002 Mar 28;416(6879):396-400.

Han K, Holder JL Jr, Schaaf CP, Lu H, Chen H, Kang H, Tang J, Wu Z, Hao S, Cheung SW, Yu P, Sun H, Breman AM, Patel A, Lu HC, Zoghbi HY. SHANK3 overexpression causes manic-like behaviour with unique pharmacogenetic properties. Nature. 2013 Nov 7;503(7474):72-7.

Hikida T, Jaaro-Peled H, Seshadri S, Oishi K, Hookway C, Kong S, Wu D, Xue R, Andradé M, Tankou S, Mori S, Gallagher M, Ishizuka K, Pletnikov M, Kida S, Sawa A. Dominant-negative DISC1 transgenic mice display schizophrenia-associated phenotypes detected by measures translatable to humans. Proc Natl Acad Sci U S A. 2007 Sep 4;104(36):14501-6.

Jamain S, Radyushkin K, Hammerschmidt K, Granon S, Boretius S, Varoqueaux F, Ramanantsoa N, Gallego J, Ronnenberg A, Winter D, Frahm J, Fischer J, Bourgeron T, Ehrenreich H, Brose N. Reduced social interaction and ultrasonic communication in a mouse model of monogenic heritable autism. Proc Natl Acad Sci U S A. 2008 Feb 5;105(5):1710-5.

Kaiser T, Feng G. Modeling psychiatric disorders for developing effective treatments. Nat Med. 2015 Sep;21(9):979-88.

Kane MJ, Angoa-Peréz M, Briggs DI, Sykes CE, Francescutti DM, Rosenberg DR, Kuhn DM. Mice genetically depleted of brain serotonin display social impairments, communication deficits and repetitive behaviors: possible relevance to autism. PLoS One. 2012;7(11): e48975.

Krueger DD, Osterweil EK, Chen SP, Tye LD, Bear MF. Cognitive dysfunction and prefrontal synaptic abnormalities in a mouse model of fragile X syndrome. Proc Natl Acad Sci U S A. 2011 Feb 8;108(6):2587-92. doi: 10.1073/pnas.1013855108.

Kwon CH, Luikart BW, Powell CM, Zhou J, Matheny SA, Zhang W, Li Y, Baker SJ, Parada LF. Pten regulates neuronal arborization and social interaction in mice. Neuron. 2006 May 4;50(3):377-88.

Kvajo M, McKellar H, Arguello PA, Drew LJ, Moore H, MacDermott AB, Karayiorgou M, Gogos JA. A mutation in mouse Disc1 that models a schizophrenia risk allele leads to specific alterations in neuronal architecture and cognition. Proc Natl Acad Sci U S A. 2008 May 13;105(19):7076-81.

Landgraf D, Long JE, Proulx CD, Barandas R, Malinow R, Welsh DK. Genetic Disruption of Circadian Rhythms in the Suprachiasmatic Nucleus Causes Helplessness, Behavioral Despair, and Anxiety-like Behavior in Mice. Biol Psychiatry. 2016 Mar 10. (16)31101-5.

Ledford H. CRISPR, the disruptor. Nature. 2015 Jun 4;522(7554):20-4.

McIlwain KL, Merriweather MY, Yuva-Paylor LA, Paylor R. The use of behavioral test batteries: effects of training history. Physiol Behav. 2001 Aug;73(5):705-17.

Mohn AR, Gainetdinov RR, Caron MG, Koller BH. Mice with reduced NMDA receptor expression display behaviors related to schizophrenia. Cell. 1999 Aug 20;98(4):427-36.

Müller MB, Zimmermann S, Sillaber I, Hagemeyer TP, Deussing JM, Timpl P, Kormann MS, Droste SK, Kühn R, Reul JM, Holsboer F, Wurst W. Limbic corticotropin-releasing hormone receptor 1 mediates anxiety-related behavior and hormonal adaptation to stress. Nat Neurosci. 2003 Oct;6(10):1100-7.

Nestler EJ, Hyman SE. Animal models of neuropsychiatric disorders. Nat Neurosci. 2010 Oct;13(10):1161-9.

Nuzzo R. Scientific method: statistical errors. Nature. 2014 Feb 13;506(7487):150-2.

O'Tuathaigh CM, Moran PM, Waddington JL. Genetic models of schizophrenia and related psychotic disorders: progress and pitfalls across the methodological "minefield". Cell Tissue Res. 2013 Oct;354(1):247-57.

Pearson H. Surviving a knockout blow. Nature. 2002 Jan 3;415(6867):8-9.

Peça J, Feliciano C, Ting JT, Wang W, Wells MF, Venkatraman TN, Lascola CD, Fu Z, Feng G. Shank3 mutant mice display autistic-like behaviours and striatal dysfunction. Nature. 2011 Apr 28;472(7344):437-42.

Roybal K, Theobold D, Graham A, DiNieri JA, Russo SJ, Krishnan V, Chakravarty S, Peevey J, Oehrlein N, Birnbaum S, Vitaterna MH, Orsulak P, Takahashi JS, Nestler EJ, Carlezon WA Jr, McClung CA. Mania-like behavior induced by disruption of CLOCK. Proc Natl Acad Sci U S A. 2007 Apr 10;104(15):6406-11.

Savonenko AV, Melnikova T, Laird FM, Stewart KA, Price DL, Wong PC. Alteration of BACE1-dependent NRG1/ErbB4 signaling and schizophrenia-like phenotypes in BACE1-null mice. Proc Natl Acad Sci U S A. 2008 Apr 8;105(14):5585-90.

Schmeisser MJ, Ey E, Wegener S, Bockmann J, Stempel AV, Kuebler A, Janssen AL, Udvardi PT, Shiban E, Spilker C, Balschun D, Skryabin BV, Dieck St, Smalla KH, Montag D, Leblond CS, Faure P, Torquet N, Le Sourd AM, Toro R, Grabrucker AM, Shoichet SA, Schmitz D, Kreutz MR, Bourgeron T, Gundelfinger ED, Boeckers TM. Autistic-like behaviours and hyperactivity in mice lacking ProSAP1/Shank2. Nature. 2012 **486**, 256–260 (14 June 2012)

Servadio M, Vanderschuren LJ, Trezza V. Modeling autism-relevant behavioral phenotypes in rats and mice: Do 'autistic' rodents exist? Behav Pharmacol. 2015 Sep;26(6):522-40.

Silver LM. *Mouse Genetics: Concepts and Applications.* Oxford University Press.
1995.

Silverman JL, Yang M, Lord C, Crawley JN. Behavioural phenotyping assays for mouse models of autism. Nat Rev Neurosci. 2010 Jul;11(7):490-502.

Tabuchi, K., Blundell, J., Etherton, M.R., Hammer, R.E., Liu, X., Powell, C.M., and Sudhof, T.C. (2007). A neuroligin-3 mutation implicated in autism increases inhibitory synaptic transmission in mice. Science *318*, 71–76.

Shmelkov SV, Hormigo A, Jing D, Proenca CC, Bath KG, Milde T, Shmelkov E, Kushner JS, Baljevic M, Dincheva I, Murphy AJ, Valenzuela DM, Gale NW, Yancopoulos GD, Ninan I, Lee FS, Rafii S. Slitrk5 deficiency impairs corticostriatal circuitry and leads to obsessive-compulsive-like behaviors in mice. Nat Med. 2010 May;16(5):598-602.

Welch JM, Lu J, Rodriguiz RM, Trotta NC, Peca J, Ding JD, Feliciano C, Chen M, Adams JP, Luo J, Dudek SM, Weinberg RJ, Calakos N, Wetsel WC, Feng G. Cortico-striatal synaptic defects and OCD-like behaviours in Sapap3-mutant mice. Nature. 2007 Aug 23;448(7156):894-900.

Won H, Lee HR, Gee HY, Mah W, Kim JI, Lee J, Ha S, Chung C, Jung ES, Cho YS, Park SG, Lee JS, Lee K, Kim D, Bae YC, Kaang BK, Lee MG, Kim E. Autistic-like social behaviour in Shank2-mutant mice improved by restoring NMDA receptor function. Nature. 2012 Jun 13;486(7402):261-5. doi: 10.1038/nature11208.

Weeks 6-16 Assignment Matrix

To determine the assignment that you will complete each week during Weeks 5-9 and Weeks 10-14, you must first determine your "number" for that time period. Each paper has a specific number (1-20) assigned to it on the syllabus that corresponds to a weekly assignment number. If you are presenting the first part of that paper, you are "A"; if you are presenting the second part of the paper, you are "B". For example, if you are selected to present the second half of the *Etherton et al, 2009* paper during Weeks 6-10, your presentation number is 6B and your weekly assignment number is 16. Your assignments are as follows:

Week 6: Validity evaluation
Week 7: Validity evaluation
Week 8: Paper Presentation
Week 9: Paper 7 Peer Review B
Week 10: Paper 10 Peer Review B

Week 6	Assignment	Week 7	Assignment	Week 8	Assignment	Week 9	Assignment	Week 10	Assignment
1	Paper 1: A	17	Paper 3: A	13	Paper 5: A	9	Paper 7: A	5	Paper 9: A
2	Paper 1: B	18	Paper 3: B	14	Paper 5: B	10	Paper 7: B	6	Paper 9: B
3	Paper 2: A	19	Paper 4: A	15	Paper 6: A	11	Paper 8: A	7	Paper 10: A
4	Paper 2: B	20	Paper 4: B	16	Paper 6: B	12	Paper 8: B	8	Paper 10: B
5	Paper 1 Peer Review A	1	Paper 3 Peer Review A	17	Paper 5 Peer Review A	13	Paper 7 Peer Review A	9	Paper 9 Peer Review A
6	Paper 1 Peer Review A	2	Paper 3 Peer Review A	18	Paper 5 Peer Review A	14	Paper 7 Peer Review A	10	Paper 9 Peer Review A
7	Paper 1 Peer Review B	3	Paper 3 Peer Review B	19	Paper 5 Peer Review B	15	Paper 7 Peer Review B	11	Paper 9 Peer Review B
8	Paper 1 Peer Review B	4	Paper 3 Peer Review B	20	Paper 5 Peer Review B	16	Paper 7 Peer Review B	12	Paper 9 Peer Review B
9	Paper 2 Peer Review A	5	Paper 4 Peer Review A	1	Paper 6 Peer Review A	17	Paper 8 Peer Review A	13	Paper 10 Peer Review A
10	Paper 2 Peer Review A	6	Paper 4 Peer Review A	2	Paper 6 Peer Review A	18	Paper 8 Peer Review A	14	Paper 10 Peer Review A
11	Paper 2 Peer Review B	7	Paper 4 Peer Review B	3	Paper 6 Peer Review B	19	Paper 8 Peer Review B	15	Paper 10 Peer Review B
12	Paper 2 Peer Review B	8	Paper 4 Peer Review B	4	Paper 6 Peer Review B	20	Paper 8 Peer Review B	16	Paper 10 Peer Review B
13	Validity Evaluation	9	Validity Evaluation	5	Validity Evaluation	1	Validity Evaluation	17	Validity Evaluation
14	Validity Evaluation	10	Validity Evaluation	6	Validity Evaluation	2	Validity Evaluation	18	Validity Evaluation
15	Validity Evaluation	11	Validity Evaluation	7	Validity Evaluation	3	Validity Evaluation	19	Validity Evaluation
16	Validity Evaluation	12	Validity Evaluation	8	Validity Evaluation	4	Validity Evaluation	20	Validity Evaluation
17	Validity Evaluation	13	Validity Evaluation	9	Validity Evaluation	5	Validity Evaluation	1	Validity Evaluation
18	Validity Evaluation	14	Validity Evaluation	10	Validity Evaluation	6	Validity Evaluation	2	Validity Evaluation
19	Validity Evaluation	15	Validity Evaluation	11	Validity Evaluation	7	Validity Evaluation	3	Validity Evaluation
20	Validity Evaluation	16	Validity Evaluation	12	Validity Evaluation	8	Validity Evaluation	4	Validity Evaluation

Week 11	Assignment	Week 12	Assignment	Week 13	Assignment	Week 14	Assignment	Week 15	Assignment	Week 16	
1	Paper 11: A	17	Paper 13: A	13	Paper 15: A	9	Paper 17: A	11	Paper 18: A	7	Paper 20: A
2	Paper 11: B	18	Paper 13: B	14	Paper 15: B	10	Paper 17: B	12	Paper 18: B	8	Paper 20: B
3	Paper 12: A	19	Paper 14: A	15	Paper 16: A	13	Paper 17 Peer Review A	5	Paper 19: A	13	Paper 20 Peer Review A
4	Paper 12: B	20	Paper 14: B	16	Paper 16: B	14	Paper 17 Peer Review A	6	Paper 19: B	14	Paper 20 Peer Review A
5	Paper 11 Peer Review A	1	Paper 13 Peer Review A	17	Paper 15 Peer Review A	15	Paper 17 Peer Review B	17	Paper 18 Peer Review A	15	Paper 20 Peer Review B
6	Paper 11 Peer Review A	2	Paper 13 Peer Review A	18	Paper 15 Peer Review A	16	Paper 17 Peer Review B	18	Paper 18 Peer Review A	16	Paper 20 Peer Review B
7	Paper 11 Peer Review B	3	Paper 13 Peer Review B	19	Paper 15 Peer Review B	1	Validity Evaluation	19	Paper 18 Peer Review B	1	Validity Evaluation
8	Paper 11 Peer Review B	4	Paper 13 Peer Review B	20	Paper 15 Peer Review B	2	Validity Evaluation	20	Paper 18 Peer Review B	2	Validity Evaluation
9	Paper 12 Peer Review A	5	Paper 14 Peer Review A	1	Paper 16 Peer Review A	3	Validity Evaluation	9	Paper 19 Peer Review A	3	Validity Evaluation
10	Paper 12 Peer Review A	6	Paper 14 Peer Review A	2	Paper 16 Peer Review A	4	Validity Evaluation	10	Paper 19 Peer Review A	4	Validity Evaluation
11	Paper 12 Peer Review B	7	Paper 14 Peer Review B	3	Paper 16 Peer Review B			11	Paper 19 Peer Review B		
12	Paper 12 Peer Review B	8	Paper 14 Peer Review B	4	Paper 16 Peer Review B			12	Paper 19 Peer Review B		
13	Validity Evaluation	9	Validity Evaluation	5	Validity Evaluation			5	Validity Evaluation		
14	Validity Evaluation	10	Validity Evaluation	6	Validity Evaluation			6	Validity Evaluation		
15	Validity Evaluation	11	Validity Evaluation	7	Validity Evaluation			7	Validity Evaluation		
16	Validity Evaluation	12	Validity Evaluation	8	Validity Evaluation			8	Validity Evaluation		
17	Validity Evaluation	13	Validity Evaluation	9	Validity Evaluation			17	Validity Evaluation		
18	Validity Evaluation	14	Validity Evaluation	10	Validity Evaluation			18	Validity Evaluation		
19	Validity Evaluation	15	Validity Evaluation	11	Validity Evaluation			19	Validity Evaluation		
20	Validity Evaluation	16	Validity Evaluation	12	Validity Evaluation			20	Validity Evaluation		

	Important Notes
5	2 assignments week 15
6	2 assignments week 15
17	2 assignments week 15
18	2 assignment week 15
19	2 assignment week 15
20	2 assignment week 15