

Washington State University
MAJOR CURRICULAR CHANGE FORM - - NEW/RESTORE COURSE

- Please attach rationale for your request, a complete syllabus, and explain how this impacts other units in Pullman and other campuses (if applicable).
- Obtain all required signatures with dates.
- Provide original stapled packet of signed form/rationale statement/syllabus PLUS 10 stapled copies of complete packet to the Registrar's Office, campus mail code 1035.
- Submit one electronic copy of complete packet to wsu.curriculum@wsu.edu.

Requested Future Effective Date: Fall 2017 (term/year) Course Typically Offered: Fall every other year
 DEADLINES: For fall term effective date: **October 1st**; for spring or summer term effective date: **February 1st**. See instructions.
 NOTE: Items received after deadlines may be put to the back of the line or forwarded to the following year. Please submit on time.

New Course Temporary Course Restore Course

ED PSYCH 577 Item Response Theory
 course subject/crosslist course no. title
3 (3 -) ED PSYCH 511;
 Credit hrs lecture hrs lab or studio prerequisite
 per week hrs per week

Description for catalog: The course provides an introduction to item response theory and examines the use of item response theory in the social sciences.

Additional Attributes: Check all that apply.

Crosslisting (between WSU departments)* Conjoint listing (400/500): _____
 Variable credit: _____ Repeat credit (cum. max. hrs): _____

Special Grading: S, F; A, S, F (PEACT only); S, M, F (VET MED only); H, S, F (PHARMACY, PHARDSCI only)
 Cooperative with UI Other (please list request): _____

The following items require prior submission to other committees/depts. (SEE INSTRUCTIONS.)

Request to meet Writing in the Major [M] requirement (Must have All-University Writing Committee Approval.)
 Request to meet UCORE in _____ (Must have UCORE Committee Approval >> See instructions.)
 Special Course Fee _____ (Must submit request to University Receivables.)

Contact: Brian French/Lynn Buckley Phone number: 335-9117 Campus mail code: 2136
 Email: frenchb@wsu.edu/buckleyl@wsu.edu Instructor, if different: _____

K Ward Chair/date 10-30-15 Kudva 11-19-15 Dean/date _____ All-University Writing Com / date
 _____ Chair (if crosslisted/interdisciplinary)* _____ Dean (if crosslisted/interdisciplinary)* _____ UCORE Committee Approval Date
 _____ Catalog Subcommittee Approval Date _____ GSC or AAC Approval Date _____ Faculty Senate Approval Date

***If the proposed change impacts or involves collaboration with other units, use the additional signature lines provided for each impacted unit and college.**

French, B. F.

Educational Leadership, Sports Studies, Educational / Counseling Psychology

New Course Description and Rationale:

ED PSYCH 577: Item Response Theory

Description (20 words or less):

This introduction to item response theory covers the understanding of the components of item response theory, applications, and examination of methodological issues.

Rationale:

The advanced doctoral topic titled *Item Response Theory* will be taught in the fall semester and offered every other year. It is anticipated that students will enroll in the course from various areas around campus. Item response theory is used in many social and behavioral science areas from education and psychology to business and communications. The course adds to a series of other Educational Psychology courses focused on educational and psychological measurement, statistics, and research methodology. No such course exists at Washington State University.

This doctoral level course provides students with the technical foundation and computer software training necessary to conduct item response theory (IRT) analyses (e.g., developing instruments, scale development, equating, estimation, item calibration, examination of measurement invariance) in their area. For doctoral students to gain a significant background in these techniques and to appropriately conduct such analyses continues to be difficult on some campuses, as some graduate schools do not offer a semester long course on item response theory. Rather it taught as a topic within a general or advanced measurement course. This is insufficient to properly train students to use IRT in their work, be it in industry or academics.

IRT is perhaps the most important technical innovations in educational and psychological measurement in the past 50 years. IRT, as a theory, provides an advanced statistical framework for modeling item-level response patterns as a function of one or more underlying traits or abilities. The statistical models provide powerful ways to understand measurement precision, as well as ways to construct scales not available via traditional methods. IRT is used by test companies to create educational, personality, employment selection, health outcomes, and licensure and certification assessments. These models are seen in use in schools on a daily basis with computer adaptive assessments as well as with testing programs such as the GRE to assessing knowledge of medical professionals as well as their patients. Researchers employ IRT methods both in applied and methodological work to advance the area of assessment and testing. IRT methods are used is gathering validity evidence to support test score use for making decisions about persons. See the *Standards for Educational and Psychology Testing* (AERA, APA, & NCME, 2014). Doctoral students need to be properly trained to be quality consumers and producers of IRT research. This course is focused on providing such training. Moreover, it aligns with WSU strategic goals by providing a premier education and transformative experience that prepares students to excel in a global society. Regardless of a graduate's career path related to assessment, be it industry or academics, an understanding of IRT is essential.

This course is not expected to impact other units with the college or across campuses.

EDPSY 577– Item Response Theory-3 credits
Fall, Monday 1:10-4:00pm, Ed Ad 216

Instructor: Brian French, Ph.D.
Office: Cleveland 362
Office Hours: Tuesday 9-10am or by appointment
Telephone: 335-8584
Email address: frenchb@wsu.edu

Prerequisites:

Previous coursework covering multivariate statistics and measurement theory. Basic data analysis experience is assumed. **Courses:** Ed PSYCH 511 or equivalent.

Purpose:

The course will provide a general introduction to item response theory (IRT) and examine the use of IRT in the social sciences. IRT is the most important technical innovations in educational and psychological measurement in the past 50 years. IRT gives us an advanced statistical framework for modeling item-level response patterns from many types of assessments as a function of one or more underlying traits. The statistical models used in IRT provide ways to understand measurement precision and the relationship between item characteristics and examinees' proficiencies in ways traditional test theory does not allow. The course focuses on (a) understanding the basic components of IRT, (b) practical applications, and (c) in-depth examination of methodological issues. Emphasis will be placed on the application IRT and its mathematical foundation. In the course, the student will (a) develop skills to conduct IRT research and (b) critically review the use of IRT in research.

Learning Outcomes: The learning outcomes below are mapped to the assignments which will be used to evaluate the outcomes.

Upon completion of the course the student will:

1. Understand the essential concepts and terminology of IRT, **as demonstrated through the 5 homework assignments.**
2. Understand research studies using IRT, **as demonstrated through homework assignments.**
3. Understand the distinctions between the 1PL, 2PL, and 3PL models for dichotomous data; **as demonstrated through the 5 homework assignments.**
4. Understand the general properties of the PCM, RSM and GPCM for polytomous data, **as demonstrated through the 5 homework assignments.**
5. Understand the mathematical and theoretical rationale underlying IRT, **as demonstrated through the 5 homework assignments.**
6. Become familiar with using software for IRT, **as demonstrated through homework assignments and the course project.**
7. Conduct IRT analyses, **as demonstrated through homework assignments and the course project.**
8. Present results, as well as interpret and discuss the findings, **as demonstrated through homework assignments and class presentation.**
9. Be familiar with topics in applications of IRT to practical testing problems, including, differential item functioning, scaling, and constructing assessments, **as demonstrated through discussion in class and the 5 homework assignments.**

Texts and Readings

There are two (2) required texts and primary readings as well as several recommended books. The student is encouraged to consult the additional texts for further discussions of issues. Readings may be added or deleted as necessary. Some texts may be available in the lab for projects. We will also read several journal articles both in application and in methodology development. As required/requested by the Graduate Studies committee, please note Textbooks are available through the Bookie and other online retailers.

Required

1. De Ayala, R. J. (2009). *Theory and practice of item response theory*. Guilford Press.

2. Embretson, S. E., & Reise, S. P. (2000). *Item response theory for psychologists*. New Jersey: Erlbaum.

Suggested for additional reading

Classical Test Theory (CTT)

Crocker, L., & Algina, J. (1986). *Introduction to classical and modern test theory*. New York: Harcourt Brace.

Traub, R. E. (1994). *Reliability for the social sciences: Theory and applications*. Thousand Oaks: Sage

IRT

Crocker, L., & Algina, J. (1986). *Introduction to classical and modern test theory*. New York: Harcourt Brace.

Hambleton, R. K., Swaminathan, H., & Rogers, H. J. (1991). *Fundamentals of item response theory*. Newbury Park: Sage.

Lord, F. M. (1980). *Applications of item response theory to practical testing problems*. Hillsdale, NJ: Erlbaum

Software:

Computer lab work is a component of the course. This will give the student the opportunity to apply what is discussed in class. Students will be exposed to SAS, BILOG, MULTLOG, FlexMIRT. Other software may be introduced as time allows or need arises. Software is available in the university computer labs.

Grades:

Grades will be based on (a) participation in class discussions (20%), (b) in-class presentations (20%), (c) homework assignments (20%), and (d) final project (40%). Attendance is expected. Please notify the instructor in advance if you are unable to attend class. There is no penalty for missing class. However, you are responsible for the material covered during any class you miss. You are encouraged to work together and assist each other with the course material and assignments. However, all assignments should be your own work. Academic honesty is expected. **Please note that grading in Table 1 is only in whole numbers. Standard rounding rules apply. Late Policy:** Assignments turned in after the due date will not be eligible for credit toward the final grade you earn. Late assignments will be worth 0 points.

Course Grading Standards:

Table 1

Grade Scale For The Course Displaying Percent Associated With Letter Grade

Grade	Percent
A	100 - 93%
A-	92 - 90%
B+	89 - 87%
B	86 - 83%
B-	82 - 80%
C+	79 - 77%
C	76 - 73%
C-	72 - 70%
D+	69 - 67%
D	66 - 60%
F	59% or below

Please note that grading in Table 1 is only in whole numbers. Standard rounding rules apply.

Assignments:

There will be five homework assignments during the semester. These are in addition to the class presentations and project. These assignments will give you a chance to demonstrate what is being learned in class. The data and further information will be provided regarding these assignments throughout the semester. Data and sample code files will be available. You will have sufficient time, instruction, and information to complete the assignment. Thus, late assignments will not be accepted and result in 0 points for that assignment.

Participation in class discussions:

To earn the 20% percent of your grade based on class participation, I will rate your participation on a 3-point scale ranging from 0 (no participation) to 2 (satisfactory participation). Ratings will occur no less than 9 times throughout the

course. Ratings will be averaged over the semester. A 0 is defined as making no contributions to the discussions, not asking questions, not being prepared to discuss material when called upon, as example behaviors. A rating of 1 is defined as demonstrating some of these behaviors in a positive and consistent manner. A rating of 2 is defined as consistently adding meaningful and thoughtful comments to the discussion, being prepared to respond to questions when called upon, and asking questions about the material. These represent example satisfactory behaviors.

As this is a doctoral seminar, students are expected to actively participate in class. This means you should ask questions, raise points discussed in the articles and chapters, and come to class prepared to assist with the learning of the material. Expect to spend time in class working to understand information from the readings as well as conducting analysis. I understand that learning the software and analysis can be frustrating but the long term reward is worth it!

Presentations:

Each student will give two presentations throughout the semester. One presentation will be of an empirical article the student selects to critically review for its use of IRT. **Please give a paper copy or a PDF copy of the article to me one week prior to your presentation.** I will make these papers available for the class to read. An outline for what you should cover is posted on the course website. Your presentation should take no more than 15 minutes.

The second presentation will involve presenting your final project. More details will be given in class. This presentation will be similar to giving a conference talk. The length will be approximately 12 minutes with 2 of the twelve minutes for questions. We will schedule these presentations throughout the last 3 weeks of the course.

Final Project:

This is an opportunity to demonstrate what you have learned throughout the semester. The project involves conducting a IRT based study on data that are of interest to you. The dataset can be obtained from one of your professors, colleagues, or one that you have collected. A methodological study (i.e., simulation study) of an aspect of IRT also is acceptable. If you have questions about a data source, please ask. I can also generate data for you but need sufficient time to do so (i.e., 3-4 weeks). Projects will be presented to the class at the end of the semester. This is one of your presentations. The written report is **due on 4/27**

The project report must be typed and follow APA format (6th edition). The APA style manual is available at the bookstore and in the reference section of the library. Font size should be no smaller than 10 or larger than 12 point. Page margins should be 1.0 inch. The paper should be written in a form suitable for publication or submission for a conference paper in your area with a limit of 3500 words, excluding references, tables, and figures. I will have examples posted on the latest WSU system (e.g., Blackboard). **Computer programs and sample output from the analysis must be provided with the paper.** More details will be given in class. Please proof read your work carefully. Incorrect grammar, misspelled words, and not following APA format are unacceptable. **Projects given to me after the due date will not be eligible for credit toward your final grade.**

Course and out of course time:

It is WSU policy that for every hour of in-class instruction, or equivalent online instruction, that students should expect at least 2 hours of outside class course preparation in the form of reading, course assignments, and review of previous lectures.

Mobile Phones/Beepers/PDAs/Computers

Any student carrying a mobile phone/beeper or other PDA should turn it off or set it to vibrate during class. In the event that a student must remain "on-call" during class, they should plan to sit where they can easily leave the room without disturbing others. Also, please refrain from sending text messages or participating in other social media outlets (e.g., Facebook) while in class. **If you cannot refrain from such activities you will be asked to leave the classroom.**

Academic Integrity

Academic integrity is the cornerstone of the university. Any student who attempts to gain an unfair advantage over other students by cheating, will fail the assignment and be reported to the Office Student Standards and Accountability. Cheating is defined in the Standards for Student Conduct WAC 504-26-010 (3). Attention to this policy is particularly important in a course like EDPSY/EDRES 565, in which collaboration with other students is encouraged. If, for example, you work closely with other students during the planning, execution, or interpretation of your data analyses – a process that I support – you should make sure that the other students' contributions are recognized explicitly in your written account. **Academic dishonesty is not tolerated and will result in action (i.e., failing the assignment and/or**

course depending on the nature of the offense) in accord with the policy. Please contact me if you have questions with this issue.

Disability Accommodations

Students with Disabilities: Reasonable accommodations are available for students with a documented disability. If you have a disability and need accommodations to fully participate in this class, please either visit or call the Access Center (Washington Building 217; 509-335-3417) to schedule an appointment with an Access Advisor. All accommodations **MUST** be approved through the Access Center. For more information contact a Disability Specialist on your home campus:

Pullman or WSU Online: 509-335-3417 <http://accesscenter.wsu.edu>, Access.Center@wsu.edu

Emergency Notification System

Washington State University is committed to enhancing the safety of the students, faculty, staff, and visitors. It is highly recommended that you review the Campus Safety Plan (<http://safetyplan.wsu.edu/>) and visit the Office of Emergency Management web site (<http://oem.wsu.edu/>) for a comprehensive listing of university policies, procedures, statistics, and information related to campus safety, emergency management, and the health and welfare of the campus community.

Safety

Classroom and campus safety are of paramount importance at Washington State University, and are the shared responsibility of the entire campus population. WSU urges students to follow the “**Alert, Assess, Act**” protocol for all types of emergencies and the “*Run, Hide, Fight*” response for an active shooter incident.

Remain **ALERT** (through direct observation or emergency notification), **ASSESS** your specific situation, and **ACT** in the most appropriate way to assure your own safety (and the safety of others if you are able).

Please sign up for emergency alerts on your account at MyWSU. For more information on this subject, campus safety, and related topics, please view the FBI’s *Run, Hide, Fight* video and visit the WSU safety portal.

**577 Schedule (subject to change in necessary): Readings may be added or changed as needed.
Changes may occur due to Official University Holidays**

Week	TOPIC	ASSIGNMENT DUE/READINGS
1	Course Overview	Discuss HW1 for next week and format throughout the semester
2	Review of measurement topics and CTT	E&R Ch. 1
3	An overview of IRT and its assumptions	E&R Ch. 2 E&R Ch. 3 (pp. 40-48) De Ayala, Ch1
4	IRT Models	E&R Ch. 4 (pp. 65-76) E&R Ch. 5 (pp. 95-97, 105-119) De Ayala, Ch2, Appendix C
5	Finish IRT Models and Using software to run IRT analyses	De Ayala Ch 5, 6-- examples in Bilog/Mulilog
6	Scaling and scale transformations	E&R Ch. 6
7	Parameter estimation	E&R Ch. 7 (pp. 158-171) E&R Ch. 8 (pp. 187-214) De Ayala, Ch3-4, Appendix A,B
8	Measurement Error in IRT	E&R Ch. 7 (pp. 183-186), readings as assigned DUE: OUTLINE for PROJECT including references—
9	Applied analyses using Software	De Ayala examples in Bilog/Multilog; DUE: 250 word abstract for project
10	Model-data fit	De Ayala, Ch2, 5, 6
11	Construction of tests-continue from week 10.	De Ayala, Ch2, 5, 6
12	Models for polytomous data	De Ayala, Ch7-8;
13	Test score equating and linking	De Ayala Ch 11
14	Measurement invariance and item bias	De Ayala, Ch 12;
15	Multidimensional and multilevel IRT. Computerized Adaptive Testing (CAT).	De Ayala Ch 10; Appendix D; DUE: Final Project Written Report
16	Finals week	Finals week