

1. General Information

1a. Submitted by the College of: EDUCATION

Date Submitted: 11/12/2015

1b. Department/Division: Educational, School and Counseling Psych

1c. Contact Person

Name: Michael Toland

Email: toland.md@uky.edu

Phone: 257-3395

Responsible Faculty ID (if different from Contact)

Name: Kelly Bradley

Email: kdbrad2@uky.edu

Phone: 257-4923

1d. Requested Effective Date: Semester following approval

1e. Should this course be a UK Core Course? No

2. Designation and Description of Proposed Course

2a. Will this course also be offered through Distance Learning?: No

2b. Prefix and Number: EDP 712

2c. Full Title: Advanced Psychometric Methods

2d. Transcript Title:

2e. Cross-listing: EPE 712

2f. Meeting Patterns

LECTURE: 2

LABORATORY: 2

2g. Grading System: Graduate School Grade Scale

2h. Number of credit hours: 3

2i. Is this course repeatable for additional credit? Yes

If Yes: Maximum number of credit hours: 12

If Yes: Will this course allow multiple registrations during the same semester? Yes

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2j. **Course Description for Bulletin:** This course will provide students with an overview of the theory and applications of advanced psychometric methods. A psychometric method focuses on advanced psychometric methodologies used in methodologically-oriented studies in educational measurement and evaluation techniques. The goal of this course is to prepare students to analyze data using advanced psychometric methods. It covers topics in the areas of Rasch Modeling, Item Response Theory, Structural Equation Modeling, Advanced Survey Techniques, and Latent Variable Modeling (as well as additional techniques). Given the advanced nature of the course, we will not shy away from using the mathematical tools needed to develop the conceptual understanding. But the emphasis of the course will be on the conceptual understanding and application of the tools rather than on the math or the mechanics behind the tools.

2k. **Prerequisites, if any:** Intermediate Statistics

2l. **Supplementary Teaching Component:**

3. **Will this course taught off campus?** No

If YES, enter the off campus address:

4. **Frequency of Course Offering:** Spring,

Will the course be offered every year?: Yes

If No, explain:

5. **Are facilities and personnel necessary for the proposed new course available?:** Yes

If No, explain:

6. **What enrollment (per section per semester) may reasonably be expected?:** 15

7. **Anticipated Student Demand**

Will this course serve students primarily within the degree program?: Yes

Will it be of interest to a significant number of students outside the degree pgm?: Yes

If Yes, explain: This course will be for all graduate level students interested in specific psychometric techniques. Enrollment will come from students from the College of Education, Business, Communications, Statistics, Public Health, and others.

8. **Check the category most applicable to this course:** Traditional – Offered in Corresponding Departments at Universities Elsewhere,

If No, explain:

9. **Course Relationship to Program(s).**

a. **Is this course part of a proposed new program?:** No

If YES, name the proposed new program:

b. **Will this course be a new requirement for ANY program?:** No

If YES, list affected programs:

10. **Information to be Placed on Syllabus.**

a. Is the course 400G or 500?: No

b. The syllabus, including course description, student learning outcomes, and grading policies (and 400G-/500-level grading differentiation if applicable, from 10.a above) are attached: Yes

Distance Learning Form

Instructor Name:

Instructor Email:

Internet/Web-based: No

Interactive Video: No

Hybrid: No

1. How does this course provide for timely and appropriate interaction between students and faculty and among students? Does the course syllabus conform to University Senate Syllabus Guidelines, specifically the Distance Learning Considerations?

2. How do you ensure that the experience for a DL student is comparable to that of a classroom-based student's experience? Aspects to explore: textbooks, course goals, assessment of student learning outcomes, etc.

3. How is the integrity of student work ensured? Please speak to aspects such as password-protected course portals, proctors for exams at interactive video sites; academic offense policy; etc.

4. Will offering this course via DL result in at least 25% or at least 50% (based on total credit hours required for completion) of a degree program being offered via any form of DL, as defined above?

If yes, which percentage, and which program(s)?

5. How are students taking the course via DL assured of equivalent access to student services, similar to that of a student taking the class in a traditional classroom setting?

6. How do course requirements ensure that students make appropriate use of learning resources?

7. Please explain specifically how access is provided to laboratories, facilities, and equipment appropriate to the course or program.

8. How are students informed of procedures for resolving technical complaints? Does the syllabus list the entities available to offer technical help with the delivery and/or receipt of the course, such as the Information Technology Customer Service Center (<http://www.uky.edu/UKIT/>)?

9. Will the course be delivered via services available through the Distance Learning Program (DLP) and the Academic Technology Group (ATL)? NO

If no, explain how student enrolled in DL courses are able to use the technology employed, as well as how students will be provided with assistance in using said technology.

10. Does the syllabus contain all the required components? NO

11. I, the instructor of record, have read and understood all of the university-level statements regarding DL.

Instructor Name:

SIGNATURE|RJREES2|Robert J Reese|EDP 712 NEW Dept Review|20151027

SIGNATURE|MYRT|Martha L Geoghegan|EDP 712 NEW College Review|20160113

SIGNATURE|ZNNIKO0|Roshan N Nikou|EDP 712 NEW Graduate Council Review|20160223

New Course Form

https://myuk.uky.edu/sap/bc/soap/rfc?services=

Generate F

[Open in full window to print or save](#)

Attachments:

Upload File

	ID	Attachment
Delete	5662	712_Syllabus_done.docx
Delete	6154	712_Syllabus_done_01.26.2016.docx

1

(*denotes required fields)

1. General Information

- a. * Submitted by the College of: Submission Date: 11/12/2015
- b. * Department/Division:
- c.
 - * Contact Person Name: Email: Phone:
 - * Responsible Faculty ID (if different from Contact): Email: Phone:
- d. * Requested Effective Date: Semester following approval OR Specific Term/Year¹
- e.
 - Should this course be a UK Core Course? Yes No
 - If YES, check the areas that apply:
 - Inquiry - Arts & Creativity
 - Inquiry - Humanities
 - Inquiry - Nat/Math/Phys Sci
 - Inquiry - Social Sciences
 - Composition & Communications - I
 - Composition & Communications - II
 - Quantitative Foundations
 - Statistical Inferential Reasoning
 - U.S. Citizenship, Community, Diversity
 - Global Dynamics

2. Designation and Description of Proposed Course.

- a. * Will this course also be offered through Distance Learning? Yes⁴ No
- b. * Prefix and Number:
- c. * Full Title:
- d. Transcript Title (if full title is more than 40 characters):
- e. To be Cross-Listed² with (Prefix and Number):
- f. * Courses must be described by at least one of the meeting patterns below. Include number of actual contact hours³ for each meeting pattern type.

<input type="text" value="2"/> Lecture	<input type="text" value="2"/> Laboratory ¹	<input type="text"/> Recitation	<input type="text"/> Discussion
<input type="text"/> Indep. Study	<input type="text"/> Clinical	<input type="text"/> Colloquium	<input type="text"/> Practicum
<input type="text"/> Research	<input type="text"/> Residency	<input type="text"/> Seminar	<input type="text"/> Studio
<input type="text"/> Other	If Other, Please explain: <input type="text"/>		
- g. * Identify a grading system:
 - Letter (A, B, C, etc.)
 - Pass/Fail
 - Medicine Numeric Grade (Non-medical students will receive a letter grade)
 - Graduate School Grade Scale
- h. * Number of credits:
- i. * Is this course repeatable for additional credit? Yes No
 - If YES: Maximum number of credit hours:
 - If YES: Will this course allow multiple registrations during the same semester? Yes No

j. * Course Description for Bulletin:

This course will provide students with an overview of the theory and applications of advanced psychometric methods. A psychometric method focuses on advanced psychometric methodologies used in methodologically-oriented studies in educational measurement and evaluation techniques. The goal of this course is to prepare students to analyze data using advanced psychometric methods. It covers topics in the areas of Rasch Modeling, Item Response Theory, Structural Equation Modeling, Advanced Survey Techniques, and Latent Variable Modeling (as well as additional techniques). Given the advanced nature of the course, we will not shy away from using the mathematical tools needed to develop the conceptual understanding. But the emphasis of the course will be on the conceptual understanding and application of the tools rather than on the math or the mechanics behind the tools.

k. Prerequisites, if any:

Intermediate Statistics

l. Supplementary teaching component, if any: Community-Based Experience Service Learning Both3. * Will this course be taught off campus? Yes No

If YES, enter the off campus address: _____

4. Frequency of Course Offering.

a. * Course will be offered (check all that apply): Fall Spring Summer Winter

b. * Will the course be offered every year? Yes No

If No, explain: _____

5. * Are facilities and personnel necessary for the proposed new course available? Yes No

If No, explain: _____

6. * What enrollment (per section per semester) may reasonably be expected? 15

7. Anticipated Student Demand.

a. * Will this course serve students primarily within the degree program? Yes No

b. * Will it be of interest to a significant number of students outside the degree program? Yes No

If YES, explain: _____

This course will be for all graduate level students interested in specific psychometric techniques. Enrollment will come from students from the College of Education, Business, Communications, Statistics, Public Health, and

8. * Check the category most applicable to this course:

Traditional -- Offered in Corresponding Departments at Universities Elsewhere

Relatively New -- Now Being Widely Established

Not Yet Found in Many (or Any) Other Universities

9. Course Relationship to Program(s).

a. * Is this course part of a proposed new program? Yes No

If YES, name the proposed new program: _____

b. * Will this course be a new requirement ^afor ANY program? Yes No

If YES ^a, list affected programs: _____

10. Information to be Placed on Syllabus.

a. * Is the course 400G or 500? Yes No

If YES, the *differentiation for undergraduate and graduate students must be included* in the information required in 10.b. You must include: (i) *ident* additional assignments by the graduate students; and/or (ii) *establishment of different grading criteria in the course for graduate students.* (See SR

b. * The syllabus, including course description, student learning outcomes, and grading policies (and 400G-/500-level grading differentiation if applicable 10.a above) are attached.

^a Courses are typically made effective for the semester following approval. No course will be made effective until all approvals are received.
^b The chair of the cross-listing department must sign off on the Signature Routing Log.

- In general, undergraduate courses are developed on the principle that one semester hour of credit represents one hour of classroom meeting per week for a semester, exclusive of any laboratory meeting. Laboratory meeting, generally, require two hours per week for a semester for one credit hour. (from SR 5.2.1)
- You must also submit the Distance Learning Form in order for the proposed course to be considered for DL delivery.
- In order to change a program, a program change form must also be submitted.

Rev 8/09

New course to replace advanced psychometric methods seminars taught in regular sequence in
EPE and EDP

EPE/EDP 712 Advanced Psychometric Methods

Instructor will vary by topic.

Credit Hours: 3 credit hours per class, repeatable up to 12 hours

Class Meetings: Class will meet 2.5 hours per week, in either 140 or 245 TEB (computer smart classrooms)

Course Goals and Prerequisites:

The goal of this course is to provide students with knowledge of how to perform advanced psychometric methods useful in addressing measurement issues in utility. It will allow them to more critically review research published that claims to have addressed measurement problems. The prerequisite is the first two semesters of psychometric methods, with a minimum of intermediate statistics or the equivalent as approved by the instructor.

Course Description: This course will provide students with an overview of the theory and applications of advanced psychometric methods. A psychometric method focuses on advanced psychometric methodologies used in methodologically-oriented studies in educational measurement and evaluation techniques. The goal of this course is to prepare students to analyze data using advanced psychometric methods. It covers topics in the areas of Rasch Modeling, Item Response Theory, Structural Equation Modeling, Advanced Survey Techniques, and Latent Variable Modeling (as well as additional techniques). Given the advanced nature of the course, we will not shy away from using the mathematical tools needed to develop the conceptual understanding. But the emphasis of the course will be on the conceptual understanding and application of the tools rather than on the math or the mechanics behind the tools.

Student Learning Objectives: The ultimate objective is that by the end of this course you will be able to:

- Conceptually understand the psychometric techniques covered in the course and how they can be applied to analyze a variety of measurement problems
- Interpret the results of psychometric analyses and think critically about the potential issues that arise when trying to draw conclusions from such results
- Conduct analyses using appropriate psychometric software packages
- Prepare a proposal or manuscript for publication using at least one of the measurement models used in the course

Grading: Grading will be based on approximately 3 homework (totaling 60%), one final project or final exam (30%) and class participation (10%) that will involve both data analysis and a thoughtful description of both the analysis and the findings. One homework will involve a class presentation. Depending on the size of the class, some assignments may be done in groups.

Grading scale for graduate students will be earned as follows:

A: $90\% \leq \text{Final Course \%} \leq 100\%$

B: $80\% \leq \text{Final Course \%} < 90\%$

C: $70\% \leq \text{Final Course \%} < 80\%$

E: $\text{Final Course \%} < 70\%$

COURSE POLICIES AND PROCEDURES

Learning/Classroom Accommodations. If you have a documented disability that requires academic accommodations, please make the request to the University Disability Resource Center. The center will require current disability documentation. When accommodations are approved, the Center will provide me with a Letter of Accommodation which details the recommended accommodations. Contact the Disability Resource Center (Jake Karnes, Director at 859-257-2754, email address: jkarnes@email.uky.edu).

Statement of Diversity. The course will be conducted with openness and respect to all individuals' points of view and experience. The activities and discussions will not tolerate discrimination or prejudice toward any person or group's religion, ethnicity, disability, gender, or sexual orientation.

Ethics. Students are allowed and strongly encouraged to discuss in pairs or groups the homework, but they are expected to turn in their own independent work which should be phrased in their own words and to complete exams independently.

Per university policy, students shall not plagiarize, cheat, or falsify or misuse academic records. Students are expected to adhere to University policy on cheating and plagiarism in all courses. The minimum penalty for a first offense is a zero on the assessment (e.g., quiz, homework, exam, project) on which the offense occurred. If the offense is considered severe or the student has other academic offenses on their record, more serious penalties, up to suspension from the university may be imposed.

Plagiarism and cheating are serious breaches of academic conduct. Each student is advised to become familiar with the various forms of academic dishonesty as explained in the Code of Student Rights and Responsibilities. Complete information can be found at the following website: <http://www.uky.edu/Ombud>. A plea of ignorance is not acceptable as a defense against the charge of academic dishonesty. It is important that you review this information as all ideas borrowed from others need to be properly credited.

Part II of *Student Rights and Responsibilities* (available online <http://www.uky.edu/StudentAffairs/Code/part2.html>) states that all academic work, written or otherwise, submitted by students to their instructors or other academic supervisors, is expected to be the result of their own thought, research, or self-expression. In cases where students feel unsure about the question of plagiarism involving their own work, they are obliged to consult their instructors on the matter before submission.

When students submit work purporting to be their own, but which in any way borrows ideas, organizations, wording or anything else from another source without appropriate acknowledgement of the fact, the students are guilty of plagiarism. Plagiarism includes reproducing someone else's work, whether it be a published article, chapter of a book, a paper from a friend or some file, or something similar to this. Plagiarism also includes the practice of employing or allowing another person to alter or revise the work which a student submits as his/her own, whoever that other person may be.

Students may discuss assignments among themselves or with an instructor or tutor, but when the actual work is done, it must be done by the student, and the student alone. When a student's assignment involves research in outside sources or information, the student must carefully acknowledge exactly what, where and how he/she employed them. If the words of someone else are used, the student must put quotation marks around the passage in question and add an appropriate indication of its origin. Making simple changes while leaving the organization, content and phraseology intact is plagiarism. However, nothing in these Rules shall apply to those ideas which are so generally and freely circulated as to be a part of the public domain (Section 6.3.1).

Note: Any assignment you turn in may be submitted to an electronic database to check for plagiarism.

Submission of Work. All course work are due on the dates specified in the course schedule listed on Bb. *LATE ASSESSMENTS WILL BE ACCEPTED AT THE SOLE DISCRETION OF THE INSTRUCTOR.* Exceptions will be made **ONLY** in extreme circumstances, such as (but not limited to) an incapacitating illness or injury, or a death in the family. Since the course materials are posted on Bb, events such as (but not limited to) vacation/travel plans, social obligations, or family gatherings do not constitute exceptions. If students must miss a scheduled task, they must notify me about the reason for the absence before it occurs. In the event of emergency absences (e.g., personal illness, major accident, death of family member), students should notify the instructor as soon as possible, preferably through e-mail communication. Additional assessments may be required for missed tasks.

Attendance and Absences. Attendance is counted through participation in weekly assignments. Failure to participate (when assigned to be completed) will be considered an unexcused absence. Having six absences, whether excused or unexcused, will result in removal from the course.

Part II, Section 5.2.4.2. (<http://www.uky.edu/StudentAffairs/Code/part2.html>) of the Student Rights and Responsibilities defines the expectations regarding excused absences. I do have the right to request verification regarding excused absences.

Excused absences include (as defined at the web site above):

- Significant illness of student or serious illness of household member or immediate family
- Death of a household member or immediate family
- Trips for members of student organizations, class excursions or participation in intercollegiate athletic events
- Religious holidays (see http://www.uky.edu/Ombud/ForFaculty_ReligiousHolidays.php)
- Any other circumstance that the instructor finds reasonable cause for nonattendance

Students with excused absences will have a week to complete any missed assignments from the day they return to class. If a student misses an exam due to an excused absence, it is the student's responsibility to schedule a time with the instructor to make up the exam in the

New course to replace advanced psychometric methods seminars taught in regular sequence in EPE and EDP

following week:

Incomplete Grade. Incomplete grades for this course are issued reluctantly and sparingly. The university permits students one calendar year—unless a shorter time frame is determined mutually by the student and instructor—to remove an “I” grade. If the contracted work is not completed satisfactorily, the “I” grade converts automatically to an “E” (a failing mark). UK rules require students requesting an “I” grade to complete a contract specifying how and when the “I” will be removed within the calendar year. The contract must be submitted to the course instructor before an “I” grade can be issued. Incomplete work and missing assessments will be assigned “E” grades if the student does not submit a completed Incomplete Grade Contract by the time the course ends.

Behavior, Decorum and Civility. Please be respectful to others in the class and engage in civil discourse when we discuss topics that have a diversity of perspectives. Please minimize distractions by closing out other windows on your computer and not using other devices while you are engaged in the course.

Outline of course topics and readings: The following outline describes the topics that will be covered in sections of 712. The variety of topics is why this course is repeatable for up to 12 hours. Associated readings for each course are provided; however, specific text book requirements and reading list will be supplied by the individual instructor per class.

Rasch Modeling

Rasch analysis constructs linear measures from scored observations, such as responses to multiple-choice questions, Likert scales and quality-of-life assessments. This course covers the practical aspects of data setup, analysis, output interpretation, fit analysis, differential item functioning, dimensionality and reporting.

- Wright, B. D., & Masters, G. M. (1982). *Rating scale analysis*. Chicago, IL: Mesa Press.
- Wright, B. D., & Stone, M. H. (1979). *Best test design*. Chicago, IL: Mesa Press.
- Bond & Fox (2007). *Applying the Rasch Model: Fundamental Measurement in the Human Sciences*. 2nd ed.
- Winsteps Manual, available for download at www.winsteps.com
- Rasch Measurement Transactions & SIG Activity; <http://www.rasch.org/rmt/>

Item Response Theory

The course of item response theory (IRT) will introduce specific terminologies, models, and computer programs of IRT and apply them to educational and psychological test data. In the first phase, we will focus on development and difference between classical test theory (CTT) and IRT, as well as their application fields. In the second phase, we will focus on several practical fields of applications of IRT models, such as model-data fit, test equating, differential item functioning, test construction, and computerized adaptive testing.

- De Ayala, R. J. (2009). *The Theory and Practice of Item Response Theory*. New York, NY: Guilford.*
- Hambleton, R.K., Swaminathan, H., & Rogers, H.J. (1991). *Fundamentals of item response theory*. Newbury Park: Sage.

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- Introduction to Item Response Theory (1991), Hambleton, Swaminathan, & Rogers, Sage Series: Measurement Methods in the Social Sciences (R. Jaeger, Ed.)
- Item response theory: principles & applications (1985). Hambleton & Swaminathan. Boston: Kluwer Publishing
- Applications of item response theory to practical testing problems, Lord, F. Hillsdale, NJ: Lawrence Erlbaum Associates
- Item response theory: parameter estimation techniques, Baker, F. B. (1992). New York: Marcel Dekker, Inc.

Structural Equation Modeling

Theory, application, interpretation of Structural Equation Modeling (SEM) techniques. Includes covariance structures, path diagrams, path analysis, model identification, estimation, and testing. Additional topics include: covariance structures, path diagrams, path analysis, model identification, estimation, and testing.

- Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2nd Ed). New York: Guilford Press.
- Byrne, B. B. (2010). *Structural equation modeling using AMOS. Basic concepts, applications, and programming* (2nd Ed). New York: Routledge.
- Brown, Timothy A., (2006). *Confirmatory Factor Analysis for Applied Research*. London: The Guilford Press.
- Muthén, Linda K. & Muthén, B. O. (2007). *Mplus User's Guide* (5th ed.). Los Angeles: Muthén & Muthén.

Latent Variable Modeling

This course introduces students to the concept of latent variables and the relationship of latent variables to observed measures (e.g. surveys, diagnostic tools). This is an applied course and has students practice examining this relationship using factor analysis, latent class analysis, path analysis, structural equation modeling, and latent class regression.

- Beaujean, A. A. (2014). *Latent variable modeling using R: A step-by-step guide*. New York: Routledge.
- Duncan, T. E., & Duncan, S. C. (2006). *An introduction to latent variable growth curve modeling: Concepts, issues, and applications* (4th ed.). New York: Routledge.
- Loehlin, J. C. (2011). *Latent variable models: An introduction to factor, path, and structural equation analysis*.
- Skrondal, A., & Rabe-Hesketh, S. (2000). *Interdisciplinary statistics, generalized latent variable modeling: Multilevel, longitudinal, and structural equation modeling* (2nd ed.). Boca Raton: Chapman & Hall/CRC. Mahwah: Lawrence Erlbaum Associates, Inc., Publishers.

Advanced Survey Techniques

This course will focus on the application of basic survey techniques, and expand upon these techniques through advanced topics and techniques such as addressing sensitive subjects, surveying vulnerable populations, handling missing data, examining survey coverage and identifying the sampling frame, survey distribution challenges and issues, and coding, handling, and analyzing collected data.

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- Weisberg, H. F. (2005). *The total survey error approach: A guide to the new science of survey research*. Chicago: The University of Chicago Press
- Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). *Internet, phone, mail, and mixed-mode surveys: The tailored design method*. Hoboken: Wiley.
- Nardi, P. M. (2013). *Doing survey research* (3rd ed.). Paradigm.
- Blair, E., & Blair, J. (2015). *Applied survey sampling*. Thousand Oaks: SAGE publications.

** Additional Topics will be introduced depending on student needs and faculty interests

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EXAMPLE TENTATIVE COURSE SCHEDULE FOR ITEM RESPONSE THEORY

Week	Date	Topic	Readings from De Ayala (2009)*	Due
			Preface & Ch. 1	
1	Aug. 25	Introduction to Measurement		
2	Aug. 30	The One-Parameter Model	Ch. 2	
2	Sept. 1	The One-Parameter Model	Ch. 2	
3	Sept. 6	The One-Parameter Model	Ch. 2	
3	Sept. 8	Joint Maximum Likelihood Parameter Estimation	Ch. 3	
4	Sept. 13	Joint Maximum Likelihood Parameter Estimation	Ch. 3	
4	Sept. 15	Joint Maximum Likelihood Parameter Estimation	Ch. 3	
5	Sept. 20	Marginal Maximum Likelihood Parameter Estimation	Ch. 4	HW#1
5	Sept. 22	Marginal Maximum Likelihood Parameter Estimation	Ch. 4	
6	Sept. 27	Marginal Maximum Likelihood Parameter Estimation	Ch. 4	
6	Sept. 29	Marginal Maximum Likelihood Parameter Estimation	Ch. 4	
7	Oct. 4	The Two-Parameter Model	Ch. 5	HW#2
7	Oct. 6	The Two-Parameter Model	Ch. 5	
8	Oct. 11	The Two-Parameter Model	Ch. 5	
8	Oct. 13	The Three-Parameter Model	Ch. 6	
9	Oct. 18	The Three-Parameter Model	Ch. 6	
9	Oct. 20	The Three-Parameter Model	Ch. 6	
10	Oct. 25	Rasch Models for Ordered Polytomous Data	Ch. 7	HW#3
10	Oct. 27	Rasch Models for Ordered Polytomous Data	Ch. 7	
11	Nov. 1	Rasch Models for Ordered Polytomous Data	Ch. 7	
11	Nov. 3	Rasch Models for Ordered Polytomous Data	Ch. 7	
12	Nov. 8	Rasch Models for Ordered Polytomous Data	Ch. 7	
12	Nov. 10	Non-Rasch (IRT) Models for Ordered Polytomous Data	Ch. 8	
13	Nov. 15	Non-Rasch (IRT) Models for Ordered Polytomous Data	Ch. 8	
13	Nov. 17	Non-Rasch (IRT) Models for Ordered Polytomous Data	Ch. 8	
14	Nov. 22	Non-Rasch (IRT) Models for Ordered Polytomous Data	Ch. 8	HW#4
14	Nov. 24	HOLIDAY (NO CLASS)		
15	Nov. 29	Linking and Equating	Ch. 11	
15	Dec. 1	Linking and Equating	Ch. 11	Draft of Paper
16	Dec. 6	Differential Item Functioning	Ch. 12	
16	Dec. 8	Differential Item Functioning	Ch. 12	
17	Dec. 12	Turn in Final Paper		Final Paper

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EPE and EDP

New course to replace advanced psychometric methods seminars taught in regular sequence in
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EPE/EDP 712 Advanced Psychometric Methods

Instructor will vary by topic.

Credit Hours: 3 credit hours per class, repeatable up to 12 hours

Class Meetings: Class will meet 2.5 hours per week, in either 140 or 245 TEB (computer smart classrooms)

Course Goals and Prerequisites:

The goal of this course is to provide students with knowledge of how to perform advanced psychometric methods useful in addressing measurement issues in utility. It will allow them to more critically review research published that claims to have addressed measurement problems. The prerequisite is the first two semesters of psychometric methods, with a minimum of intermediate statistics or the equivalent as approved by the instructor.

Course Description: This course will provide students with an overview of the theory and applications of advanced psychometric methods. A psychometric method focuses on advanced psychometric methodologies used in methodologically-oriented studies in educational measurement and evaluation techniques. The goal of this course is to prepare students to analyze data using advanced psychometric methods. It covers topics in the areas of Rasch Modeling, Item Response Theory, Structural Equation Modeling, Advanced Survey Techniques, and Latent Variable Modeling (as well as additional techniques). Given the advanced nature of the course, we will not shy away from using the mathematical tools needed to develop the conceptual understanding. But the emphasis of the course will be on the conceptual understanding and application of the tools rather than on the math or the mechanics behind the tools.

Student Learning Outcomes: By the end of the course a student will be able to:

- Conceptually understand the psychometric techniques covered in the course and how they can be applied to analyze a variety of measurement problems
- Interpret the results of psychometric analyses and think critically about the potential issues that arise when trying to draw conclusions from such results
- Conduct analyses using appropriate psychometric software packages
- Prepare a proposal or manuscript for publication using at least one of the measurement models used in the course

Grading: Grading will be based on approximately 4 homework and one final paper.

Grading scale for graduate students will be earned as follows:

A: $90\% \leq \text{Final Course \%} \leq 100\%$

B: $80\% \leq \text{Final Course \%} < 90\%$

C: $70\% \leq \text{Final Course \%} < 80\%$

E: $\text{Final Course \%} < 70\%$

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Assessment	Percentage
Homework (each worth 20%)	80%
Final Paper	20%

1. **Homework:** Pairs of students will complete 4 homework covering a major topic or set of topics covered in the course. Only one copy (with both names listed) is to be submitted to the instructor. All pairs will be given a dataset(s) and expected to perform the appropriate analyses, report findings, and interpret them accordingly. Homework may also consist of finding a peer reviewed study, discussing the analyses conducted, reporting and interpreting those findings, and critiquing the study. Finally, homework will consist of additional questions covering the major topic(s). Homework will be returned within one week. Direct all homework questions to the instructor. Each homework is worth 20% of your final grade.

2. **Final Paper:** Pairs of students will complete a project on a technique learned in this course. The topic and application you choose must be approved by the instructor. The final paper will be due on the final exam date. The final paper is due in electronic form using appropriate APA style. Any final paper turned in after the final exam date and time will be reduced by 10%. Papers turned in 24 hours after the final exam due date will not be accepted and receive zero credit. It is the expectation that this paper be written in a professional manner so that it may one day be submitted to a conference and/or expanded upon for publication. Given the size of this paper, you are welcome to hand in a draft of the paper two weeks prior to the final paper due date for me to review/grade and return to you the week prior to the final paper is due so that you can decide whether you want to re-do the paper to be re-graded. Given the amount of work that is done in this course and grading, papers turned in after this deadline will be graded and not be allowed to be re-done for a re-grade. Essentially, this is your only chance to get free feedback before the final paper is due. For this paper you are required to work with one other person. If you need help coming up with a topic or need consultation during the paper, please stop by and consult with me. The final paper is worth 20% of your final grade.

COURSE POLICIES AND PROCEDURES

Learning/Classroom Accommodations. If you have a documented disability that requires academic accommodations, please make the request to the University Disability Resource Center. The center will require current disability documentation. When accommodations are approved, the Center will provide me with a Letter of Accommodation which details the recommended accommodations. Contact the Disability Resource Center (Jake Karnes, Director at 859-257-2754, email address: jkarnes@email.uky.edu).

Statement of Diversity. The course will be conducted with openness and respect to all individuals' points of view and experience. The activities and discussions will not tolerate discrimination or prejudice toward any person or group's religion, ethnicity, disability, gender, or sexual orientation.

Ethics. Students are allowed and strongly encouraged to discuss in pairs or groups the homework, but they are expected to turn in their own independent work which should be phrased in their own words and to complete exams independently.

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Per university policy, students shall not plagiarize, cheat, or falsify or misuse academic records. Students are expected to adhere to University policy on cheating and plagiarism in all courses. The minimum penalty for a first offense is a zero on the assessment (e.g., quiz, homework, exam, project) on which the offense occurred. If the offense is considered severe or the student has other academic offenses on their record, more serious penalties, up to suspension from the university may be imposed.

Plagiarism and cheating are serious breaches of academic conduct. Each student is advised to become familiar with the various forms of academic dishonesty as explained in the Code of Student Rights and Responsibilities. Complete information can be found at the following website: <http://www.uky.edu/Ombud>. A plea of ignorance is not acceptable as a defense against the charge of academic dishonesty. It is important that you review this information as all ideas borrowed from others need to be properly credited.

Part II of *Student Rights and Responsibilities* (available online <http://www.uky.edu/StudentAffairs/Code/part2.html>) states that all academic work, written or otherwise, submitted by students to their instructors or other academic supervisors, is expected to be the result of their own thought, research, or self-expression. In cases where students feel unsure about the question of plagiarism involving their own work, they are obliged to consult their instructors on the matter before submission.

When students submit work purporting to be their own, but which in any way borrows ideas, organizations, wording or anything else from another source without appropriate acknowledgement of the fact, the students are guilty of plagiarism. Plagiarism includes reproducing someone else's work, whether it be a published article, chapter of a book, a paper from a friend or some file, or something similar to this. Plagiarism also includes the practice of employing or allowing another person to alter or revise the work which a student submits as his/her own, whoever that other person may be.

Students may discuss assignments among themselves or with an instructor or tutor, but when the actual work is done, it must be done by the student, and the student alone. When a student's assignment involves research in outside sources or information, the student must carefully acknowledge exactly what, where and how he/she employed them. If the words of someone else are used, the student must put quotation marks around the passage in question and add an appropriate indication of its origin. Making simple changes while leaving the organization, content and phraseology intact is plagiarism. However, nothing in these Rules shall apply to those ideas which are so generally and freely circulated as to be a part of the public domain (Section 6.3.1).

Note: Any assignment you turn in may be submitted to an electronic database to check for plagiarism.

Submission of Work. All course work are due on the dates specified in the course schedule.
LATE ASSESSMENTS WILL BE ACCEPTED AT THE SOLE DISCRETION OF THE

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INSTRUCTOR. Exceptions will be made ONLY in extreme circumstances, such as (but not limited to) an incapacitating illness or injury, or a death in the family. Since the course materials are posted on Bb, events such as (but not limited to) vacation/travel plans, social obligations, or family gatherings do not constitute exceptions. If students must miss a scheduled task, they must notify me about the reason for the absence before it occurs. In the event of emergency absences (e.g., personal illness, major accident, death of family member), students should notify the instructor as soon as possible, preferably through e-mail communication. Additional assessments may be required for missed tasks.

Attendance and Absences. Attendance is counted through participation in weekly assignments. Failure to participate (when assigned to be completed) will be considered an unexcused absence. Having six absences, whether excused or unexcused, will result in removal from the course.

Part II, Section 5.2.4.2. (<http://www.uky.edu/StudentAffairs/Code/part2.html>) of the Student Rights and Responsibilities defines the expectations regarding excused absences. I do have the right to request verification regarding excused absences.

Excused absences include (as defined at the web site above):

- Significant illness of student or serious illness of household member or immediate family
- Death of a household member or immediate family
- Trips for members of student organizations, class excursions or participation in intercollegiate athletic events
- Religious holidays (see http://www.uky.edu/Ombud/ForFaculty_ReligiousHolidays.php)
- Any other circumstance that the instructor finds reasonable cause for nonattendance

Students with excused absences will have a week to complete any missed assignments from the day they return to class. If a student misses an exam due to an excused absence, it is the student's responsibility to schedule a time with the instructor to make up the exam in the following week.

Incomplete Grade. Incomplete grades for this course are issued reluctantly and sparingly. The university permits students one calendar year—unless a shorter time frame is determined mutually by the student and instructor—to remove an “I” grade. If the contracted work is not completed satisfactorily, the “I” grade converts automatically to an “E” (a failing mark). UK rules require students requesting an “I” grade to complete a contract specifying how and when the “I” will be removed within the calendar year. The contract must be submitted to the course instructor before an “I” grade can be issued. Incomplete work and missing assessments will be assigned “E” grades if the student does not submit a completed Incomplete Grade Contract by the time the course ends.

Behavior, Decorum and Civility. Please be respectful to others in the class and engage in civil discourse when we discuss topics that have a diversity of perspectives. Please minimize distractions by closing out other windows on your computer and not using other devices while you are engaged in the course.

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Outline of course topics and readings: The following outline describes the topics that will be covered in sections of 712. The variety of topics is why this course is repeatable for up to 12 hours. Associated readings for each course are provided; however, specific textbook requirements and reading list will be supplied by the individual instructor per course. An example course schedule for Item Response Theory is provided at the end of this document.

Item Response Theory

The course of item response theory (IRT) will introduce specific terminologies, models, and computer programs of IRT and apply them to educational and psychological test data. In the first phase, we will focus on development and difference between classical test theory (CTT) and IRT, as well as their application fields. In the second phase, we will focus on several practical fields of applications of IRT models, such as model-data fit, test equating, differential item functioning, test construction, and computerized adaptive testing. Listed below are books, a manual, and a URL that will be used in this course on IRT. Based on the instructor of the course, readings will be assigned appropriately.

Required textbook:

- De Ayala, R. J. (2009). *The Theory and Practice of Item Response Theory*. New York, NY: Guilford.

Optional textbooks:

- Hambleton, R.K., Swaminathan, H., & Rogers, H.J. (1991). *Fundamentals of item response theory*. Newbury Park: Sage.
- Introduction to Item Response Theory (1991), Hambleton, Swaminathan, & Rogers, Sage Series: Measurement Methods in the Social Sciences (R. Jaeger, Ed.)
- Item response theory: principles & applications (1985). Hambleton & Swaminathan. Boston: Kluwer Publishing
- Applications of item response theory to practical testing problems, Lord, F. Hillsdale, NJ: Lawrence Erlbaum Associates
- Item response theory: parameter estimation techniques, Baker, F. B. (1992). New York: Marcel Dekker, Inc.

Rasch Modeling

Rasch analysis focuses on constructs linear measures from scored observations, such as responses to multiple-choice questions, Likert scales and quality-of-life assessments. This course covers the practical aspects of data setup, analysis, output interpretation, fit analysis, differential item functioning, dimensionality and reporting. Listed below are books, a manual, and a URL that will be used in this course. Based on the instructor of the course, readings will be assigned appropriately.

Required textbook:

- Wright, B. D., & Masters, G. M. (1982). *Rating scale analysis*. Chicago, IL: Mesa Press.

Optional textbooks:

- Wright, B. D., & Stone, M. H. (1979). *Best test design*. Chicago, IL: Mesa Press.
- Bond & Fox (2007). *Applying the Rasch Model: Fundamental Measurement in the Human Sciences*. 2nd ed.
- Winsteps Manual, available for download at www.winsteps.com
- Rasch Measurement Transactions & SIG Activity; <http://www.rasch.org/rmt/>

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Structural Equation Modeling

Theory, application, interpretation of Structural Equation Modeling (SEM) techniques. Includes covariance structures, path diagrams, path analysis, model identification, estimation, and testing. Additional topics include: covariance structures, path diagrams, path analysis, model identification, estimation, and testing.

Required textbook:

- Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2nd Ed). New York: Guilford Press.

Optional textbooks and manuals:

- Byrne, B. B. (2010). *Structural equation modeling using AMOS. Basic concepts, applications, and programming* (2nd Ed). New York: Routledge.
- Brown, Timothy A., (2006). *Confirmatory Factor Analysis for Applied Research*. London: The Guilford Press.
- Muthén, Linda K. & Muthén, B. O. (2007). *Mplus User's Guide* (5th ed.). Los Angeles: Muthén & Muthén.

Latent Variable Modeling

This course introduces students to the concept of latent variables and the relationship of latent variables to observed measures (e.g. surveys, diagnostic tools). This is an applied course and has students practice examining this relationship using factor analysis, latent class analysis, path analysis, structural equation modeling, and latent class regression.

Required textbook:

- Finch, H., & French, B. F. (2015). *Latent variable modeling with R*. New York, NY: Routledge

Optional textbook:

- Beaujean, A. A. (2014). *Latent variable modeling using R: A step-by-step guide*. New York: Routledge.
- Duncan, T. E., & Duncan, S. C. (2006). *An introduction to latent variable growth curve modeling: Concepts, issues, and applications* (4th ed.). New York: Routledge.
- Loehlin, J. C. (2011). *Latent variable models: An introduction to factor, path, and structural equation analysis*.
- Skrondal, A., & Rabe-Hesketh, S. (2000). *Interdisciplinary statistics, generalized latent variable modeling: Multilevel, longitudinal, and structural equation modeling* (2nd ed.). Boca Raton: Chapman & Hall/CRC. Mahwah: Lawrence Erlbaum Associates, Inc., Publishers.

Advanced Survey Techniques

This course will focus on the application of basic survey techniques, and expand upon these techniques through advanced topics and techniques such as addressing sensitive subjects, surveying vulnerable populations, handling missing data, examining survey coverage and identifying the sampling frame, survey distribution challenges and issues, and coding, handling, and analyzing collected data.

Required textbook:

- Weisberg, H. F. (2005). *The total survey error approach: A guide to the new science of survey research*. Chicago: The University of Chicago Press

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Optional textbooks:

- Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). Internet, phone, mail, and mixed-mode surveys: The tailored design method. Hoboken: Wiley.
- Nardi, P. M. (2013). Doing survey research (3rd ed.). Paradigm.
- Blair, E., & Blair, J. (2015). Applied survey sampling. Thousand Oaks: SAGE publications.

**** Additional Topics will be introduced depending on student needs and faculty interests**

EXAMPLE TENTATIVE COURSE SCHEDULE FOR ITEM RESPONSE THEORY

Week	Date	Topic	Readings from De Ayala (2009)*	Due
1	Aug. 25	Introduction to Measurement	Preface & Ch. 1 (pp. 1-10)	
2	Aug. 30	The One-Parameter Model	Ch. 2 (pp. 11-38)	
2	Sept. 1	The One-Parameter Model	Ch. 2 (pp. 11-38)	
3	Sept. 6	The One-Parameter Model	Ch. 2 (pp. 11-38)	
3	Sept. 8	Joint Maximum Likelihood Parameter Estimation	Ch. 3 (pp. 39-67)	
4	Sept. 13	Joint Maximum Likelihood Parameter Estimation	Ch. 3 (pp. 39-67)	
4	Sept. 15	Joint Maximum Likelihood Parameter Estimation	Ch. 3 (pp. 39-67)	
5	Sept. 20	Marginal Maximum Likelihood Parameter Estimation	Ch. 4 (68 – 98)	HW#1
5	Sept. 22	Marginal Maximum Likelihood Parameter Estimation	Ch. 4 (68 – 98)	
6	Sept. 27	Marginal Maximum Likelihood Parameter Estimation	Ch. 4 (68 – 98)	
6	Sept. 29	Marginal Maximum Likelihood Parameter Estimation	Ch. 4 (68 – 98)	
7	Oct. 4	The Two-Parameter Model	Ch. 5 (pp. 99-122)	HW#2
7	Oct. 6	The Two-Parameter Model	Ch. 5 (pp. 99-122)	
8	Oct. 11	The Two-Parameter Model	Ch. 5 (pp. 99-122)	
8	Oct. 13	The Three-Parameter Model	Ch. 6 (123-161)	
9	Oct. 18	The Three-Parameter Model	Ch. 6 (123-161)	
9	Oct. 20	The Three-Parameter Model	Ch. 6 (123-161)	
10	Oct. 25	Rasch Models for Ordered Polytomous Data	Ch. 7 (pp. 162-208)	HW#3
10	Oct. 27	Rasch Models for Ordered Polytomous Data	Ch. 7 (pp. 162-208)	
11	Nov. 1	Rasch Models for Ordered Polytomous Data	Ch. 7 (pp. 162-208)	
11	Nov. 3	Rasch Models for Ordered Polytomous Data	Ch. 7 (pp. 162-208)	
12	Nov. 8	Rasch Models for Ordered Polytomous Data	Ch. 7 (pp. 162-208)	
12	Nov. 10	Non-Rasch (IRT) Models for Ordered Polytomous Data	Ch. 8 (pp. 209-236)	
13	Nov. 15	Non-Rasch (IRT) Models for Ordered Polytomous Data	Ch. 8 (pp. 209-236)	

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13	Nov. 17	Non-Rasch (IRT) Models for Ordered Polytomous Data	Ch. 8 (pp. 209-236)	
14	Nov. 22	Non-Rasch (IRT) Models for Ordered Polytomous Data	Ch. 8 (pp. 209-236)	HW#4
14	Nov. 24	HOLIDAY (NO CLASS)		
15	Nov. 29	Linking and Equating	Ch. 11 (pp. 306-322)	
15	Dec. 1	Linking and Equating	Ch. 11 (pp. 306-322)	Draft of Paper
16	Dec. 6	Differential Item Functioning	Ch. 12 (pp. 323-346)	
16	Dec. 8	Differential Item Functioning	Ch. 12 (pp. 323-346)	
17	Dec. 12	Turn in Final Paper		Final Paper