HASKAYNE
Executive
EDUCATION

INTRODUCTION TO MEDIATION, MODERATION AND CONDITIONAL PROCESS ANALYSIS

Leading expert Dr. Andrew Hayes, PhD will guide the learner through topics in the statistical analysis of mechanisms responsible for causal effects as well as their contingencies, popularly known as mediation and moderation analysis, as well as their integration as conditional process analysis. This introductory course is recommended to all levels of learners prior to taking *Mediation, Moderation and Conditional Process Analysis: A Second Course*.

Start date:	January 11, 2022
Program Delivery:	Online, asynchronous
Commitment:	3 weeks
Investment:	$625 (Canadian dollars)
Instructor:	Dr. Andrew Hayes, PhD

LEARNING STATEMENT

In this course, you will learn about the underlying principles and the practical applications of mediation, moderation and conditional process analysis. It covers six broad topics:

1. Direct, indirect and total effects in a mediation model
2. Estimation and inference in single mediator models using ordinary least squares regression
3. Estimation and inference in models with more than one mediator
4. Moderation or “interaction” in ordinary least squares regression
5. Testing, interpreting, probing and visualizing interactions
6. The integration of mediation and moderation: Conditional process analysis

SUMMARY

Statistical mediation and moderation analyses are among the most widely used data analysis techniques in social science, health and business research. Mediation analysis is used to test hypotheses about various intervening mechanisms by which causal effects operate. Moderation analysis is used to examine and explore questions about the contingencies or conditions of an effect, also called "interaction." Increasingly, moderation and mediation are being integrated analytically in the form of what has become known as "conditional process analysis," used when the goal is to understand the contingencies or conditions under which mechanisms operate. An understanding of the fundamentals of mediation and moderation analysis is in the job description of almost any empirical scholar. In this course, you will learn about the underlying principles and the practical applications of these methods using ordinary least squares (OLS) regression analysis and the PROCESS macro for SPSS, SAS and R, invented by the course instructor and widely used in the behavioral sciences. This course is a companion to the instructor's book ***Introduction to Mediation, Moderation, and Conditional Process Analysis***, published by The Guilford Press. A copy of the book is not required to benefit from the course, but it could be helpful to reinforce understanding.

TIME COMMITMENT AND COURSE DELIVERY

This online course consists of a collection of 16 modules in the form of videos and exercises that can be completed with a time commitment of about 6-8 hours/week. You can participate at your own convenience; there are no set times when you are required to be online during the offering period, and you can rewind the videos and review modules completed at your leisure. Questions can be sent to the instructor and others in the class through a discussion board on the course delivery platform. The course can be accessed with any recent web browser on almost any computing platform, including iPhone, iPad and Android devices.

COMPUTING

Computer applications will focus on the use of ordinary least squares regression and the PROCESS macro for SPSS, SAS and R, developed by the instructor, that makes the analyses described in this class much easier than they otherwise would be. This is a hands-on course, so maximum benefit results when learners can follow along with analyses using a laptop or desktop computer with a recent version of SPSS Statistics (version 23 or later), SAS (release 9.2 or later, with PROC IML installed) or R (version 3.6; base module only. No packages are used in this course). Learners can choose which statistical package they prefer to use. STATA users can benefit from the course content, but PROCESS makes these analyses much easier and is not available for STATA.

WHO WILL BENEFIT?

This course will be helpful for researchers in any field —including psychology, sociology, education, business, human development, social work, public health, communication and others that rely on social science methodology —who want to learn how to apply the methods of moderation and mediation analysis using widely-used software such as SPSS, SAS and R.

Learners are recommended to have familiarity with the practice of multiple regression analysis and elementary statistical inference. No knowledge of matrix algebra is required or assumed, nor is matrix algebra used in the delivery of course content. Learners should also have some experience with the use of SPSS, SAS or R, including opening and executing data files and programs.

LEARNING OUTCOMES

Upon completing this course, you will be able to

- Statistically partition one variable's effect on another into its primary pathways of influence, direct and indirect
- Understand modern approaches to inference about indirect effects in mediation models
- Test competing theories of mechanisms statistically through the comparison of indirect effects in models with multiple mediators
- Understand how to build flexibility into a regression model that allows a variable's effect to be a function of another variable in a model
- Visualize and probe interactions in regression models (e.g., using the simple slopes/spotlight analysis and Johnson-Neyman/floodlight analysis approaches)
- Integrate models involving moderation and mediation into a conditional process model
- Estimate the contingencies of mechanisms through the computation and inference about conditional indirect effects
- Determine whether a mechanism is dependent on a moderator variable
- Apply the methods discussed in this course using the PROCESS procedure for SPSS, SAS and R
- Talk and write in an informed way about the mechanisms and contingencies of causal effects

INSTRUCTOR BIO

Dr. Andrew Hayes is a quantitative methodologist and holds a PhD in Psychology from Cornell University as well as a BA in Psychology from San Jose State University. His research and writing on applied statistical methods has been published in such journals as Psychological Methods, Multivariate Behavioral Research, Behavior Research Methods, British Journal of Mathematical and Statistical Psychology, Psychological Science, Journal of Educational and Behavioral Statistics, American Behavioral Scientist, Communication Monographs, Journal of Communication and Australasian Marketing Journal, among many others.

He is the author of Introduction to Mediation, Moderation, and Conditional Process Analysis (2018) and Regression Analysis and Linear Models (2017), both published by The Guilford Press, and Statistical Methods for Communication Science (2005), published by Routledge. He also invented the PROCESS macro for SPSS, SAS and R (**processmacro.org**) that is widely used by researchers examining the mechanisms and contingencies of effects. He teaches courses on applied data analysis and also conducts online and in-person workshops on statistical analysis to multidisciplinary audiences throughout the world, most frequently to faculty and graduate students in business schools but also in education, psychology, social work, communication, public health and government researchers. His work has been cited over 130,000 times according to **Google Scholar** and he has been designated a Highly Cited Researcher by Clarivate Analytics in 2019 and 2020. Visit his website to learn more (**afhayes.com**).

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EDUCATION

MEDIATION, MODERATION AND CONDITIONAL PROCESS ANALYSIS: A SECOND COURSE

Leading expert Dr. Andrew Hayes, PhD will guide learners through key topics in causal analysis focusing on advanced applications and methods of mediation, moderation and conditional process analysis. It is recommended that learners take *Part 1: Introduction to Mediation, Moderation and Conditional Process Analysis* prior to enrolling in the advanced course.

Start date:	February 15, 2022
Program Delivery:	Online, asynchronous
Commitment:	3 weeks
Investment:	$625 (Canadian dollars)
Instructor:	Dr. Andrew Hayes, PhD

LEARNING STATEMENT

This second course on mediation, moderation and conditional process analysis continues where the introductory course concludes. Upon completing this learning program, you will have a more detailed understanding of the following topics:

1. Serial mediation and serial moderated mediation
2. Mediation, moderation and conditional process analysis with a multi-categorical cause or moderator
3. Estimating, probing, and interpreting models with two moderators
4. Testing, visualizing, and probing three-way interaction (moderated moderation)
5. Partial, conditional and moderated moderated mediation
6. Using PROCESS and the creation of custom models in PROCESS

SUMMARY

Statistical mediation and moderation analyses are among the most widely used data analysis techniques. Mediation analysis is used to test various intervening mechanisms by which causal effects operate. Moderation analysis is used to examine and explore questions about the contingencies or conditions of an effect, also called "interaction." Conditional process analysis is the integration of mediation and moderation analysis and used when one seeks to understand the conditional nature of processes (i.e. "moderated mediation")

In his book, Introduction to ***Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach***, Dr. Hayes describes the fundamentals of mediation, moderation and conditional process analysis using ordinary least squares regression. He also explains how to use PROCESS, a freely-available and handy tool he invented that brings modern approaches to mediation and moderation analysis within convenient reach. This online course picks up where the first introductory course leaves off. After a review of basic principles, it covers material in the second edition of the book not covered in the first course, as well as new material not available in the book.

TIME COMMITMENT AND COURSE DELIVERY

This online course consists of a collection of 10 modules in the form of videos and exercises that can be completed with a time commitment of about 6-8 hours/week. You can participate at your own convenience; there are no set times when you are required to be online during the offering period, and you can rewind the videos and review modules completed at your leisure. Questions can be sent to the instructor and others in the class through a discussion board on the course delivery platform. The course can be accessed with any recent web browser on almost any computing platform, including iPhone, iPad and Android devices.

COMPUTING

Computer applications will focus on the use of ordinary least squares regression and the PROCESS macro for SPSS, SAS and R developed by the instructor that makes the analyses described in this class much easier than they otherwise would be. This is a hands-on course, so maximum benefit results when learners can follow along with analyses using a laptop or desktop computer with a recent version of SPSS Statistics (version 23 or later), SAS (release 9.2 or later, with PROC IML installed) or R (version 3.6; base module only. No packages are used in this course). Learners can choose which statistical package they prefer to use. STATA users can benefit from the course content, but PROCESS makes these analyses much easier and is not available for STATA.

WHO WILL BENEFIT?

This course will be helpful for researchers in any field —including psychology, sociology, education, business, human development, social work, public health, communication and others that rely on social science methodology —who want to learn how to apply the latest methods in moderation and mediation analysis using readily-available software packages such as SPSS, SAS and R. Because this is an advanced course, participants should either be familiar with the contents of the first edition of Introduction to Mediation, Moderation, and Conditional Process Analysis and the statistical procedures discussed therein, or should have taken the first course through Haskayne School of Business Executive Education or other vendors in the recent past. Participants should also have experience using syntax in SPSS, SAS or R and

a good working knowledge of multiple linear regression. No knowledge of matrix algebra is required or assumed, nor is matrix algebra ever used in the course. Some prior use of PROCESS is desirable but not required, as a review of the use of PROCESS syntax is included in one of the course modules.

LEARNING OUTCOMES

Upon completing this course, you will be able to:

- Estimate and interpret mediation models with mediators operating in serial
- Conduct a conditional process analysis with models with more than one mediator (serial and parallel)
- Understand the concept of differential dominance and appreciate its value in theory and research
- Estimate and interpret relative direct, indirect, and total effects in a mediation model with a multi-categorical (more than 2 groups) independent variable
- Test, visualize, probe and interpret moderation (interaction) in a model with a multi-categorical independent variable or moderator
- Conduct a conditional process analysis with a multi-categorical independent variable
- Distinguish mathematically and in use the additive (dual moderation) and multiplicative (moderated moderation) model that includes two moderators of the effect of a variable
- Test, visualize, and interpret partial, conditional, and moderated moderated mediation
- Use PROCESS in more advanced ways, such as how to modify a numbered model or create a custom model

INSTRUCTOR BIO

Dr. Andrew Hayes is a quantitative methodologist and holds a PhD in Psychology from Cornell University as well as a BA in Psychology from San Jose State University. His research and writing on applied statistical methods has been published in such journals as Psychological Methods, Multivariate Behavioral Research, Behavior Research Methods, British Journal of Mathematical and Statistical Psychology, Psychological Science, Journal of Educational and Behavioral Statistics, American Behavioral Scientist, Communication Monographs, Journal of Communication and Australasian Marketing Journal, among many others.

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