



## *Logic and Foundations of Mathematics*

**Instructor:** Dr. Ianna West

**Office:** Peltier 106-B

**Office Hours:** *For immediate online consultation:* Monday, Wednesday and Friday 9:30AM – 12:00 Noon unless otherwise specified.

To fulfill the University requirement, I am generally in my Nicholls' on-campus office on Tuesdays and Thursdays from 10:30AM – 3:00PM. You may reach me during these hours by phone or email. I am also available most of the time for consultation via email outside of my regularly scheduled online hours and on-site office hours. I will reply to emails within 48 hours Monday through Friday. In addition, I will be available to answer questions on some weekends and holidays. You may make an appointment to speak with me by telephone, Skype or Adobe Connect.

**Email:** [ianna.west@nicholls.edu](mailto:ianna.west@nicholls.edu)

**Office Phone:** 985-448-4394

**Moodle:** <http://moodle2.nicholls.edu/moodle/>

**Section:** WWP (Online)

### **Required Textbook or eChapters**

Either the textbook or eChapters of *A Transition to Advanced Mathematics 7<sup>th</sup> Edition* by Douglas Smith, Maurice Eggen and Richard St. Andre, published by Brooks/Cole or Cengage is required. The purchase of the actual textbook is highly recommended. It is a great book to own because it can be used as a reference in other courses. However, in this course, material from only a few chapters of the textbook will be used. Students have the option to purchase the book or purchase eChapters from the publisher as needed for \$22.99 each.

[Click Here to View Book Purchase Options](#)

**Suggested Reference Textbooks:** *A Discrete Transition to Advanced Mathematics* by Bettina Richmond and Thomas Richmond; *Conjecture & Proof: An Introduction to Mathematical Thinking* by Diane Driscoll Schwartz; *Mathematical Reasoning, Writing and Proof* by Ted Sundstrom; *Proof, Logic, and Conjecture: The Mathematician's Toolbox* by Robert S. Wolf; *Foundations of Higher Mathematics* by Peter Fletcher and C. Wayne Patty.

**Prerequisites:** MATH 265 (Calculus III) and MATH 358 (Foundations of Mathematics).

### **Catalog Course Description:**

**MATH 509. Logic and Foundations of Mathematics.** 3-3-0. Prerequisites: MATH 265 and 358.

Cornerstone course normally taken in first semester of graduate study. Developing and evaluating arguments and proofs, the use of various types of reasoning, methods of proof, making and investigating conjectures.

**Extended Course Description:** This course is designed to teach the components of proving mathematical statements which will help prepare students for other advanced mathematics courses. In this course, students will gain the necessary skills to formally prove statements written as theorems, lemmas and/or propositions by applying established methods, definitions, properties and other theorems, corollaries, lemmas, etc. Students will study how to utilize tautologies to rearrange and/or simplify a complicated theorem making it easier to determine what method should be used to prove it.

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**Course Learning Objectives:**

Student will be able to:

1. Apply standard mathematical language;
  2. Formulate definitions of given mathematical terms;
  3. Form conjectures;
  4. Discuss the plausibility of a conjecture without a formal proof;
  5. Use counterexamples to disprove false conjectures;
  6. Apply set theory;
  7. Prove theorems involving set theory;
  8. Develop assertions as theorems;
  9. Use propositional logic to construct a proof;
  10. Apply rules of inference following a logical sequence of steps to prove a statement or statements written in symbolic form.
  11. Use assumptions, axioms, previously proved theorems and definitions in proofs.
  12. Apply various methods of proof including direct proof, proof by contrapositive, proof by contradiction, and different forms of mathematical induction.
  13. Utilize tautologies to simplify complicated statements and then write a formal proof.
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***Minimal Technical Skills, Hardware and Software Requirements:***

Access to a computer with internet is required. The majority of the information needed to take this course will be posted on the Moodle, the learning management system (LMS) used by Nicholls, as well as your Nicholls email account.

A word processor such as Microsoft Word is highly recommended or a scanner is required to scan and upload written assignments. Scanned assignments must be saved as a pdf file and uploaded to Moodle as one document. I will not accept an assignment unless it is uploaded as single pdf document. Furthermore, handwritten, uploaded assignments must be clear and legible. If a handwritten assignment is not legible, the student will be required to use Microsoft Word or some other word processor to type the assignment. If a word processor other than Microsoft Word is used, the assignment must be submitted in pdf format, and the mathematical equations, expressions, symbols, etc. must be legible. If Microsoft Word is used, student must upload it as a Word document. If Microsoft Word is used, then an equation editor must be used.

I highly recommend *Mathtype*, a powerful interactive equation editor for Windows and Macintosh that enables creation of mathematical notation for word processing. *Mathtype* works in conjunction with Microsoft Word. *Mathtype* may be purchased at a cost of \$57 online at <http://www.dessci.com/en/products/mathtype/>.

Students must access their Nicholls email account to receive and send emails. Criteria for email communication can be found on the Moodle course homepage. The criteria for formatting the Subject Line of an email must be followed; otherwise the instructor may not reply.

Students must be able to attach a file to an email, upload a file on Moodle, etc. Students must be able to open a PDF document using Acrobat Reader or some other PDF reader which may be downloaded free from the internet. If the students are not familiar with one or more of the software and/or web-based tools mentioned, students must have the ability to familiarize themselves with these necessary web-based tools and/or software either by exploration or tutorials.

***Links to important websites and/or tutorials:***

The URL for the University's distance learning website is  
<http://www.nicholls.edu/distance/> .

FAQS about internet courses can be viewed at the website  
<http://www.nicholls.edu/distance/faqs/> .

The FAQS website will give students insight as to what they should expect from an online course, as well as answer many frequently asked questions.

A Moodle Tutorial can be viewed at the website  
<http://www.nicholls.edu/distance/moodle-tutorial/> .

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## **Attendance Requirements, Course Content, Methods of Evaluation and Point Distribution**

***On-Campus Meeting or Proctor Requirements:*** Students will meet on-campus to take the final exam if they live within a reasonable driving distance of the campus. Distance learners must locate an approved testing facility near their home. There is a link to a Proctor Approval Form located on the course homepage of Moodle which must be completed by the student. A list of approved testing centers is given on the Proctor Approval Form.

***Proctor Requirements for Distance Learners:*** Distance learners are those students who will take the final exam off-campus because they do not live in driving distance of Nicholls' campus. Distance learners must locate an approved testing facility near their home. A list of approved testing centers is given on the Proctor Approval Form. A student wishing to take the final exam off-campus must ***inform me via email***, and ***complete the Proctor Approval form*** using Microsoft Word. The completed Proctor Approval form must be uploaded using the link provided on the Moodle course homepage.

***\*\*Completed Proctor Approval Form Deadline March 27, 2017\*\****

Once I have approved a proctor, the student who plans to take the final exam off-campus ***must schedule*** to take the test with the proctor at least three weeks prior to the test date. I will send a Test Administration Procedure Form to the approved testing center or proctor approximately one week before the scheduled exam date. The ***test administrator*** will be required to complete the Test Administration Form and return it to me before the day of the test. Therefore, if a student plans to take his or her final exam off-campus, it is vital that the student complete and upload the Proctor Approval Form by the deadline.

### ***Modules***

Modules are subsections posted on Moodle containing several folders and links. Each module contains module-level learning objectives and learning activities for a given time period. The instructor will post a new module every one to two weeks on Moodle.

A module will include the module-level learning objectives and the learning activities required to complete the objectives. The module will include an Instruction Sheet, lecture notes, assignments and assignment links, discussion forums and all other pertinent information pertaining to activities required to complete the assessments that correspond to the sections being covered during a particular time period. The modules will be posted according to the dates listed in the Course Calendar which is the last page of this syllabus. A link to the Course Calendar is also posted on the Moodle course homepage. It is important that students read all documents contained within the modules since they contain instructions on how to meet the requirements period.

#### Instruction Sheets

An Instruction Sheet will be posted in each module which will include the learning objectives, and instructions on how to achieve those objectives. Each Instruction Sheet will contain the reading assignments along with the exercise assignment and discussion forum information as well as the due dates.

#### ***Exercise Assignments***

Problems from the textbook and/or supplemental exercises will be assigned for each module. Students are required to complete all exercises. The exercises are used to assess the students' understanding of the concepts. The students will have one to two weeks to complete each assignment depending on the length and/or complexity of the material. The final grade for the exercise assignments will be based on the average of all exercise assignments and will be worth **50% of the semester grade**. The students will be required to upload all completed assignments within the corresponding module on Moodle by the due date. A document on how to format the assignments is available on the Moodle course homepage.

#### Exercise Assignment Grading and Feedback

The students should expect to receive feedback on exercise assignments within two weeks of the due dates. Some problems on the exercise assignments will be self-assessed or peer-assessed. For the problems that are peer-assessed, the name of the student will not be included in the assignment. All information on exercise assignments and how they will be graded may be found in the Instruction Sheets.

#### ***Discussion Forums***

Discussion Forums for select sections will be posted on Moodle within the modules. These assignments are to help facilitate discussions about the topics being covered. The first forum will be for the purpose of introducing yourself to the class. The Introduction Forum is located on the Moodle course homepage. The subsequent forums will correspond to the module-level learning objectives and will be posted within the modules. You will be required to post comments on the forum and reply to at least one of your classmate's post. Each discussion forum will be worth 10 points. The final grade for discussion forums will be based on the average of all forum grades and will be **worth 5% of the semester grade**. The criterion for grading the forums is on the Moodle course homepage.

#### Netiquette

When posting on forums and writing emails, the students must always follow the rules of netiquette. These rules can be found on the following website

<http://www.albion.com/netiquette/corerules.html> .

#### ***Late Submission of Exercise Assignments and Discussion Forums***

Without prior permission, students who submit an exercise assignment and/or forum late will be penalized. If a student needs more time on a particular assignment he or she must me in advance to get permission to avoid a penalty. Without my permission, if a student submits an exercise assignment or posts on a forum after the deadline, but before the assignment has been graded, the student will be penalized 25%.

If a student submits an exercise assignment after the assignment has been graded, the student will receive a zero. Additionally, once the answer key has been posted on Moodle for a self-assessed or peer-assessed assignment, a student who has not submitted his or her assignment will receive a zero. Furthermore, if the student has not posted on the Discussion Forum by the time it has been graded, the student will receive a zero.

I am aware that many of you have jobs and families and unexpected things may occur during the semester. Therefore, it is very important to stay in contact with me if you will be late on an assignment. Do not wait until after the assignment is due to ask for an extension.

### ***Final Exam***

There will be a final exam worth 45% of the semester grade. Students who live out-of-state or students who do not live within a reasonable driving distance to Nicholls' campus may request an alternative location (an approved testing center) to take the exam. Arrangements need to be made by the student in advance. Please see the "Proctor Requirements for Distance Learners" section of the syllabus given above.

***\*\*On-campus Final Exam— Tuesday, May 9, 2017 @ 11:00AM \*\****

***\*\*Off-campus Final Exam— either May 8th or May 9th\*\****

### ***Semester Grade***

The semester grade will be calculated on a ten point grading scale 90-100 A, 80-89 B, 70-79 C, 60-69 D, below 60 F.

<i>Exercise Assignments</i>	<b>50%</b>	<b><i>**Distribution of points may change during the semester**</i></b>
<i>Discussion Forums</i>	<b>5%</b>	
<i>Final Exam</i>	<b>45%</b>	

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## **Policies and Procedures**

### ***Attendance Policy***

Participation in activities is required where an electronic record which clearly indicates time and date activity was submitted. For financial aid purposes, student must complete at least one activity, which is equivalent to having attended at least one class.

### ***Behavioral Policy***

Students must **at no time** be disrespectful toward the professor. Students must always respect the rights of classmates. Students must behave in a professional manner at all times. Failure to act in an appropriate manner will not be tolerated.

### ***Academic Dishonesty Policy***

Cheating will not be tolerated. Sanctions for academic cheating, plagiarism, and forgery of academic documents are outlined in the *Code of Student Conduct* handbook. You may access a copy of the handbook by clicking on the following link:

[http://www.nicholls.edu/documents/student\\_life/code\\_of\\_conduct.pdf](http://www.nicholls.edu/documents/student_life/code_of_conduct.pdf) .

### ***Academic Grievances***

The proper procedure for filing grade appeals or grievances related to academic matters is listed in Section 5 of the *Code of Student Conduct* handbook.

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### Assistance with Studying and Assignments

- **The Tutoring Center at** 143 Peltier Hall. Call [985-448-4100](tel:985-448-4100), email: [tutoring@nicholls.edu](mailto:tutoring@nicholls.edu), or visit <http://www.nicholls.edu/academic-enhancement/>
- **The Writing Center at** 144 Peltier Hall. Call [985-448-4100](tel:985-448-4100), email: [tutoring@nicholls.edu](mailto:tutoring@nicholls.edu), or visit <http://www.nicholls.edu/academic-enhancement/>
- **Online Tutoring through Moodle.** Look for the Brainfuse log-in link on the home page, <http://moodle2.nicholls.edu/moodle/>

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### Disabilities Services and Compliance

**Americans with Disabilities Act:** Students with a documented disability are entitled to classroom accommodations under the ADA. To receive accommodations, contact the Office of Disability Services at (985) 448-4430 or 158-A Shaver Gym. Additional information can be obtained at the following website <http://www.nicholls.edu/disability/>.

Moodle is designed to meet a variety of world accessibility requirements, including Section 508, Section 504 and W3C. Moodle supports the use of assistive technologies such as screen readers, text magnifiers and speech-to-text solutions. Additionally, all functionality in Moodle is designed to be keyboard accessible.

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### Continued Learning Following an Extreme Emergency

In order to make continued learning possible following an extreme emergency;

***Students are responsible for:***

- reading regular emergency notifications on the NSU website;
- knowing how to use and access Moodle (or university designated electronic delivery system);
- being familiar with emergency guidelines;
- evacuating textbooks and other course materials;
- knowing their Moodle (or designated system) student login and password;
- contacting faculty regarding their intentions for completing the course.

***Faculty are responsible for:***

- their development in the use of the Moodle (or designated) software;
- having a plan for continuing their courses using only Moodle and email;
- continuing their course in whatever way suits the completion of the course best, and being creative in the continuation of these courses;
- making adjustments or compensations to a student's progress in special programs with labs, clinical sequences or the like, only in the immediate semester following the emergency.

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### Holidays and Important Dates

Mardi Gras Break: February 27<sup>th</sup>, 28<sup>th</sup> & March 1<sup>st</sup>

Advising Begins: March 15<sup>th</sup>

Final day to Drop to receive W: March 24<sup>th</sup>

Early Registration Begins: March 30<sup>th</sup>

Spring Break/Easter Vacation: April 13<sup>th</sup>, 14<sup>th</sup> & 17<sup>th</sup> – 21<sup>st</sup>

Last Day of Classes: May 3<sup>rd</sup>

Final Exams: May 4<sup>th</sup>, 5<sup>th</sup>, & 8<sup>th</sup> – 10<sup>th</sup>

**\*\*The last day to drop this course with a "W" is Friday, March 24, 2017\*\***

# Math 509-WWP

# Course Calendar

# Spring 2017

**\*\* Tentative Outline (dates may change due to student needs or delays) \*\***

<b>MODULE FOLDERS</b>	<b>TOPICS</b>	<b>Tentative Post Date</b>	<b>Assignments are due by 11:59 PM on the following date.</b>
<i>Module 1</i>	<b>Module 1 Review of Basic Definitions and Properties of Set Theory and Arithmetic</b>	01/17/2017	01/27/2017
<i>Module 2</i>	<b>Module 2 Set Operations, Extended Set Operations and Indexed Families of Sets</b>	01/27/2017	02/03/2017
<i>Module 3</i>	<b>Module 3 Forming and Proving Conjectures</b>	02/03/2017	02/10/2017
<i>Module 4</i>	<b>Module 4 The Basics of Propositional Logic With an Emphasis on Conditional and Biconditional Statements</b>	02/10/2017	02/20/2017
<i>Module 5</i>	<b>Module 5 Propositional Consequences; Introduction to Direct Proof</b>	02/20/2017	03/03/2017
<i>Holiday</i>	<i>Mardi Gras and Ash Wednesday</i>	<i>02/27/2017</i>	<i>03/01/2017</i>
<i>Module 6</i>	<b>Module 6 Predicates and Quantifiers</b>	03/03/2017	03/10/2017
<i>Module 7</i>	<b>Module 7 Use Propositional Logic in Proofs</b>	03/10/2017	03/17/2017
<i>Module 8</i>	<b>Module 8 More on Basic Proof Methods</b>	03/17/2017	03/24/2017
<i>Module 9</i>	<b>Module 9 Biconditional Proofs, Proofs Involving Quantifiers, Complex Proofs and Summary of Proving Techniques</b>	03/24/2017	04/03/2017
<i>Module 10</i>	<b>Module 10 The Principle of Mathematical Induction, the Principle of Complete Induction, and the Well Ordering Principle</b>	04/03/2017	04/12/2017
<i>Holiday</i>	<i>Easter/Spring Break</i>	<i>04/13/2017</i>	<i>04/21/2017</i>
<i>Module 11</i>	<b>Module 11 To be Announced</b>	04/12/2017	05/01/2017
<b>FINAL EXAM</b>	<p><b>ON-CAMPUS</b>  <i>Comprehensive final exam is scheduled on Tuesday, May 9, 2017 at 11:00AM (Classroom to be announced).</i></p> <p><b>OFF-CAMPUS</b>  <i>If exam will be taken by a proctor, student must schedule the final exam either on May 8<sup>th</sup> or May 9<sup>th</sup>.</i></p>		

**\*\*The last day to drop this course with a “W” is Friday, March 24, 2017\*\***