

MATHEMATICS 580WWP
Topics in the School Mathematics Curriculum
Fall 2017



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Office hours: Monday – Thursday: 10:00 – 11:30 a.m. and 1:30 – 2:30 p.m. and by appointment

NOTE: I am available for appointments on any week day at any time including evening hours. Please do not hesitate to contact me at any time if you have questions and/or concerns. I can be reached by text, email, or phone.

Catalog Description: MATH 580. **Topics in the School Mathematics Curriculum.** 3-3-0. Practices, activities, and delivery methods related to curriculum development, problem solving, and critical thinking. The four focus areas are algebra, geometry, precalculus, and calculus. Standards and guidelines from professional mathematical and educational organizations are examined as rubrics for curriculum development. (27.0101)

Prerequisite or Corequisite: MATH 509. **Logic and Foundations of Mathematics for Teachers.** 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.

Course Materials:

Note: A specific textbook is not used for this course. The course primarily revolves around groups of readings based on a set of topics. Other materials in addition to the following materials may be brought in as needed. In addition, please make use of the wealth of resources available via Internet. Every course topic can be researched by each student and every student can provide further insight into course topics.

National Council of Teachers of Mathematics (2000). *Principles and standards for school mathematics*. Reston, VA <http://standards.nctm.org/>

Common Core State Standards for Mathematics (2012).

http://www.corestandards.org/assets/CCSSI_Math%20Standards.pdf or

<http://www.corestandards.org/Math>

K-12 Louisiana State Standards for Mathematics

<http://www.louisianabelieves.com/docs/default-source/teacher-toolbox-resources/louisiana-student-standards-for-k-12-math.pdf>

Mathematical Association of America (2003). *Guidelines for programs and departments in undergraduate mathematical sciences*. Washington, D.C.

<http://www.maa.org/sites/default/files/pdf/guidelines/Dept-Guidelines-Feb2003.pdf>

[Information related to the *Guidelines* can be located at: <http://www.maa.org/programs/faculty-and-departments/curriculum-department-guidelines-recommendations/program-review/guidelines-programs-departments>

American Psychological Association (*Publication manual of the American psychological*

association; sixth edition. Washington, D.C. <http://www.apastyle.org/manual/index.aspx>

[Please note that some of you may have an earlier edition; this is a reference source and updated information can be located online.

The primary need for this resource is for citations within papers and reference lists. Another source that is helpful is

<https://owl.english.purdue.edu/owl/resource/560/01/>]

Course Goal:

Given that many of the students in the MCCM program plan to work in a secondary or post-secondary setting, this course has been designed to assure that MCCM graduates can apply both general and discipline-specific curriculum theory to secondary and college mathematics curriculum development.

Students will become conversant with the thought processes that are the basis of secondary and college mathematics curricula. Curriculum issues and topics emanating from these thought processes will be detailed, along with forces that shape curriculum content, integration, delivery, and design. Mathematics curriculum research will be examined in an effort to identify critical issues such as sources of curriculum, elements of quality, and factors of importance for further research.

Course Objectives:

Upon completion of the course, the student will be able to:

- 1) Analyze the processes of mathematics curriculum development from epistemological, historical, psychological, and sociological perspectives.
- 2) Relate secondary and college mathematics curricula to external professional standards and accreditation processes as well as internal institutional development and approval processes.
- 3) Design, analyze, and assess mathematics programs and courses in conformance with the goals and objectives of the broader curriculum and institutional mission in addition to relevant external standards.
- 4) Articulate the major content themes in secondary and college mathematics courses.
- 5) Examine critically the role of textbooks and other materials in the mathematics curriculum.
- 6) Demonstrate an understanding of current research issues in mathematics curriculum at the secondary and college levels.
- 7) Judge sources of curriculum knowledge and research as reliable or otherwise.

Course Content (Tentative Schedule of Topics)

(Note that an overall understanding of the mathematics curriculum is the focus of the course. In addition, analysis of appropriate research articles will be a component of each week's topic.)

<u>Weeks 1-2:</u>	Understanding Mathematics Curriculum <ul style="list-style-type: none">• Defining curriculum• Historical antecedents• Intellectual traditions• Psychological and sociological perspectives	[Aug. 21 – Sept. 4]
<u>Weeks 3-4:</u>	External Standards & Processes for Mathematics Curriculum <i>Includes Mardi Gras HOLIDAY</i> <ul style="list-style-type: none">• Discipline-specific educational organizations• Development of national, state, and local standards• Nature of accreditation and accreditation organizations• Roles of the state departments of education• Roles of the federal government and its agencies• Syllabi standards	[Sept. 4 – Sept. 18]
<u>Weeks 5-6:</u>	Mathematics Curriculum Design Models <ul style="list-style-type: none">• Defining curriculum design• Curriculum design issues http://mathcurriculumcenter.org/research_framework.php• Schools of thought on curriculum• Secondary and college design models	[Sept. 18 – Oct. 2]
<u>Week 7-8:</u>	Mathematics Curriculum Evaluation <ul style="list-style-type: none">• Evaluation of design effectiveness within specific courses (algebra, geometry, precalculus, and calculus)• Evaluation of appropriate course sequencing including prerequisites	[Oct. 2– Oct. 16]

- Week 9:** **Internal Institutional Processes** **[Oct. 16 – Oct. 23]**
- Curriculum approval within institutional governing structures
 - Overview of curriculum approval practices nationwide

- Weeks 10-12:** **Themes and Strands in the Mathematics Disciplines** (Mathematics, Computer Science) [*Includes Easter Holiday*] **[Oct. 23– Nov. 13]**
- Major themes and strands in secondary and college mathematics
 - Continuity of disciplinary themes and strands within the secondary curriculum
 - Distinctions in rigor between courses for majors, service courses, and general courses for nonmajors

- Week 13:** **Mathematics Curriculum Implementation** **[Nov. 27 – Dec. 4]**
- Delivery modes and issues
 - Development of appropriate learning materials
 - Identifying appropriate textbooks

Hardware and Software Requirements:

The course will be conducted via Internet using Moodle and e-mail. The URL for the university’s distance learning website is <http://www.nicholls.edu/distance/> . FAQs about Internet courses can be viewed at <http://www.nicholls.edu/distance/faqs/> . A download for minimum computer requirements for taking a course on Moodle can be found in the last question on the FAQs site given above. A Moodle Tutorial can be viewed at <http://www.nicholls.edu/distance/moodle-tutorial/>.

Course Requirements:

- 1) Assigned readings from books and journals
 - 2) Substantive class discussion participation based on readings
 - 3) Maximum of three short papers
 - 4) Final Examination
 - 5) Semester Projects: 1) The development of a comprehensive teaching syllabus for a college-level mathematics course, the selection of an appropriate textbook, and other relevant learning materials.
2) The development of a curriculum evaluation plan that could be utilized for curriculum designed for any mathematics course in grades 9-12.
- (Note that assignment descriptions will be given for each project.)

Methods of Evaluation:

Class discussion (Moodle):	150-200 points
2-3 short papers:	200-300 points
Two semester projects:	250 points
Final Examination:	150 points
Total	750-900 points

Grading Scale:

90-100% A	80-89.9% B	70-79.9% C	60-69.9% D	Below 60 F
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Class discussion will primarily involve use of the Discussion Board on Moodle. There will be a minimum of 8 forums with forum responses ranging from 5-20 points. Please note that specific instructions will be provided in the Forum and not following those instructions will result in a loss of points. A single Forum may involve more than one question or topic and all questions/topics from a single Forum should be responded to in one “thread.” Follow-up comments in new threads are encouraged to allow for discussion among students.

Short papers will be assigned 2-3 times throughout the semester. APA format is required. In addition to purchasing the APA Guidelines, assistance can be found at <http://owl.english.purdue.edu/owl/resource/560/01/> Instructions with topics will be provided for each short paper. Topics will relate to assigned readings and/or research issues. Please familiarize yourself with the NSU Library website: <http://www.nicholls.edu/library/> Please check out the Student Portal as there are many resources there. www.nicholls.edu/library/student-portal/ Please “explore” the site in order to be aware of the various resources available to students. It is suggested that you view the “search tutorial” for assistance in fully utilizing the library’s resources. Citations for the short papers must come from reliable sources such as research journals, books, etc. Sites such as “Wikipedia” are not considered reliable. If you are not sure if a source is considered reliable, please contact me. It is recommended that most research be conducted using libraries and/or library databases. Open Internet searches can be valuable and provide starting points, but one must be cautious as to reliability of source. A general rubric will be used to grade each short paper and that rubric will be provided within the first few weeks of class.

Semester project descriptions will be given at least 2-4 weeks prior to the due date. An exact due date will be provided with the description.

Final examination will be “take-home” with a specified amount of time for completion. It is anticipated that the exam will be posted on Day 1 of Finals and will be due on Day 3 of Finals. Exact information will be provided within the last two weeks of class.

NOTE: All times given as part of a due date will be Central Standard Time, so please adjust accordingly.

Make-up Procedure: In that all assignments and examinations will be take-home assignments, students will have ample time to complete assignments. If a student has an emergency situation resulting in a late assignment, each situation will be handled based upon the circumstances.

Academic Honesty Policy: Disciplinary action for academic dishonesty will be handled according to the *Code of Student Conduct*. You may find a copy at the following Internet website:
http://www.nicholls.edu/documents/student_life/code_of_conduct.pdf

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 a class at least once.

Americans With Disabilities Act:

Student Access Center (SAC) (formerly known as Office of Disability Services) acts as a liaison between students and faculty to facilitate the provision of accommodations as per Americans with Disabilities Act.
<http://www.nicholls.edu/disability/>

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* and at the following link:
http://www.nicholls.edu/documents/student_life/code_of_conduct.pdf.

DROP DATE: The last day to drop a course with a “W” is: October 27, 2017

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 Blackboard (or university designated electronic delivery system);
- being familiar with emergency guidelines;
- evacuating textbooks and other course materials;
- knowing their Blackboard (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 Blackboard (or designated) software;
- having a plan for continuing their courses using only Blackboard 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.

Turnitin/SafeAssign Policy:

By taking this course, students agree that all assignments are subject to submission to Turnitin.com or SafeAssign.com (online plagiarism prevention and detection services). All work submitted to each service will be added to its database of papers. Turnitin's privacy policy and a description of the service are available at <http://www.turnitin.com>. Information about SafeAssign can be found at www.safeassign.com. Specifically, these services compare a submitted paper with Internet webpages, articles in databases, and all papers previously submitted from this university or any other. The service then either confirms the originality of your work or gives the source of plagiarism. In cases of detected plagiarism, the paper and supporting evidence will be handled in compliance with the Student Code of Conduct (http://www.nicholls.edu/life/policy/code_of_conduct.pdf).

Bibliography

Articles (Partial List):

Borst, R.W., Rorvig, V. (2006). On my mind: a national mathematics curriculum for the United States: two perspectives. *Mathematics Teaching in the Middle School*. 12(2): 70-72

Flinders, D.J., Noddings, N., & Thornton, S.J. (1986). The null curriculum: its theoretical basis and practical implications. *Curriculum Inquiry*. 16(1): 33-42.

Henkelman, J. (1965). Effecting mathematics curriculum change in the secondary school. *The American Mathematical Monthly*. 72(8): 895-897.

Herrera, T.A., Owens, D.T. (2001). The "new new math"?: two reform movements in mathematics education. *Theory into Practice*. 40(2): 84-92.

Kilpatrick, J. (2001). Where's the evidence? *Journal for Research in Mathematics Education*. 32(4): 421-427.

Kulm, G. (1999). Making sure that your mathematics curriculum meets standards. *Mathematics Teaching in the Middle School*. 4(8): 536-541.

Marcus, R., Fukawa-Connelly, T., Conklin, M., & Fey, J.T. (2007). New thinking about college mathematics: implications for high school teaching. *Mathematics Teacher*.

101(5): 354-358.

May, K.O. (1974). Mathematical education: history in the mathematics curriculum. *The American Mathematical Monthly*. 81(8): 899-901.

Reys, B.J., Bay-Williams, J.M. (2003). Spotlight on the principles: the role of textbooks in implementing the curriculum principle and the learning principle. *Mathematics Teaching in the Middle School*. 9(2): 120-125.

Popkewitz, T.S. (1988). Institutional issues in the study of school mathematics: curriculum research. *Educational Studies in Mathematics*. 19(2). Mathematics Education and Culture. (May, 1988), 221-249.

Roberts, D.L. (2001). E.H. Moore's early twentieth-century program for reform in mathematics education. *The American Mathematical Monthly*. 108(8): 689-696.

Schoen, H.L., Hirsch, C.R. (2003). Responding to calls for change in high school mathematics: implications for collegiate mathematics. *The American Mathematical Monthly*. 110(2): 689-696.

Smolarski, D.C. (2002). Teaching mathematics in the seventeenth and twenty-first centuries. *Mathematics Magazine*. 75(4): 256-262.

Usiskin, Z., (1997). Reforming the third r: changing the school mathematics curriculum: an introduction. *American Journal of Education*. 106(1): 1-4.

Usiskin, Z., (1997). Applications in the secondary school mathematics curriculum: a generation of change. *American Journal of Education*. 106(1): 62-84.

Books (Partial List):

Brookfield, S.D., (1987). *Developing critical thinkers*. New Jersey: John Wiley & Sons, Inc.

Cangelosi, J.S. (2003). *Teaching mathematics in secondary and middle school: an interactive approach*. New Jersey: Pearson Education, Inc.

McNeil, J.D. (2005). *Contemporary curriculum: in thought and action*. New Jersey: John Wiley & Sons, Inc.

Posamentier, A.S., Jaye, D., & Krulik, S. (2007). *Exemplary practices for secondary teachers*. Association for Supervision and Curriculum Development.

Rubenstein, R.N., Bright, G.W. (Eds.). (2004). *Perspectives on the teaching of mathematics*. Virginia: National Council of Teachers of Mathematics.

Stiff, L.V., Curcio, F.R. (Eds.). (1999). *Developing mathematical reasoning in grades k-12*. Virginia: National Council of Teachers of Mathematics.

Usiskin, Z., Peressini, A., Marchisotto, E.A., & Stanley, D. (2003). *Mathematics for high school teachers: an advanced perspective*. New Jersey: Pearson Education, Inc.

Zais, R.S. (1976). *Curriculum: principles and foundations*. New York: Thomas Y. Crowell Co.