

**MISSISSIPPI STATE UNIVERSITY
COLLEGE OF EDUCATION**

**DEPARTMENT of CURRICULUM, INSTRUCTION, and SPECIAL EDUCATION
COURSE SYLLABUS**

Course Prefix & Number: EDE 8123

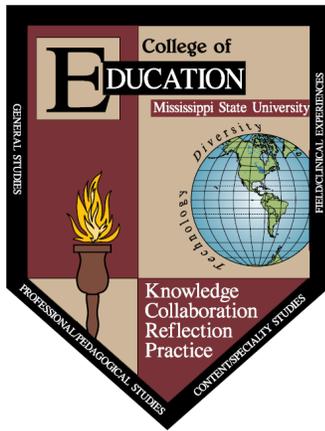
Course Title: Foundations for Teaching Middle Level Mathematics

Credit Hours: 3 Semester Hours

Course Type: Lecture.

Catalogue Description: Three hours lecture. The theoretical, pedagogical foundations and current issues and perspectives of teaching middle level mathematics; a standards-based framework for relevant teaching of number and operations.

College of Education Conceptual Framework:



The faculty in the College of Education at Mississippi State University are committed to assuring the success of students and graduates by providing superior learning opportunities that are continually improved as society, schools, and technology change. The organizing theme for the conceptual framework for the College of Education at Mississippi State University is educational professionals - dedicated to continual improvement of all students' educational experiences. The beliefs that guide program development are as follows:

1. **KNOWLEDGE** - Educational professionals must have a deep understanding of the organizing concepts, processes, and attitudes that comprise their chosen disciplinary knowledge base, the pedagogical knowledge base, and the pedagogical content knowledge base. They must also know how to complement these knowledge bases with the appropriate use of technology.
2. **COLLABORATION** - Educational professionals must continually seek opportunities to work together, learn from one another, forge partnerships, and assume positions of responsibility.
3. **REFLECTION** - Educational professionals must be willing to assess their own strengths and weaknesses through reflection. They must also possess the skills, behaviors, and attitudes necessary to learn, change, and grow as life-long learners.
4. **PRACTICE** - Educational professionals must have a rich repertoire of research-based strategies for instruction, assessment, and the use of technologies. They must be able to focus that array of skills on promoting authentic learning by all students or clients, while exhibiting an appreciation and commitment to the value and role of diversity.

Course Objectives:

Upon completion of this course, the candidate will be able to:

1. Apply the national and state standards of mathematics curriculum and instruction in middle grades (4-8) and explain how these standards have been influenced by national, state, and local professional organization such as the National Council of Teachers of Mathematics. [AMLE 2b, 4a, 4b, 4c, 4d; CFPO 1, 3, 11, 12, 14]
2. Describe theories of adolescent development and learning and the implications of these in the teaching and learning of mathematics. [AMLE 1a, 1b, 1c, 4a, 4b, 4d; CFPO 2]
3. Plan and implement tasks or activities using a problem solving approach in teaching middle level mathematics concepts of Number and Operations where students necessarily are actively engaged in reflective thought. [AMLE 1c, 1d, 2a, 2c, 4b, 4c; CFPO 1, 3, 5, 8, 11, 12, 14]
4. Plan developmentally appropriate mathematics instruction in Number & Operations for middle school students of different cultural and linguistic backgrounds, ages, and exceptionalities, particularly for those residing in rural communities. [AMLE 1b, 1c, 2a, 4a, 4b; CFPO 1, 2, 3, 5, 11, 12]
5. Critique and integrate various grade appropriate mathematical resources, such as concrete and virtual manipulatives, tutorial web-sites, dynamic math software, and calculators, into standards-based mathematics teaching for rural students in grades 4-8. [AMLE 1a, 1c, 2a, 2b, 4a, 4b; CFPO 1, 2, 3, 5, 7, 11, 12, 14]
6. Develop and use grade appropriate assessment and evaluation tools that meet the assessment principle set forth by the National Council of Teachers of Mathematics and that inform students' understanding, needs, and learning of middle school mathematics concepts focused on Number and Operations. [AMLE 2b, 4c; CFPO 1, 4]
7. Describe and apply the most current research findings in the teaching of middle school mathematics concepts of Number and Operations. [AMLE 1c, 2b, 2c, 4a, 4b; CFPO 1, 3, 5, 8, 11, 13, 14]
8. Design and implement middle school mathematics lessons that address the Common Core State Standards for Mathematics, Domains related to Number and Operations, and facilitate the eight Standards for Mathematical Practice while teaching. [AMLE 1a, 1b, 1c, 2a, 2b, 2c, 4a, 4b; CFPO 1, 3, 5, 11, 12, 14]

Topics to be Covered:

The course topics include:

- a. Learning & Doing Mathematics in the 21st Century – The National Standards-Based Movement (3 hours)
- b. National Council of Teachers of Mathematics (NCTM) Principles & Standards (5 hours)
 - 6 Principles of Mathematics Education: Teaching, Learning, Curriculum, Technology, Equity, Assessment
 - Overview of 5 Content Standards: Number & Operations, Algebra, Geometry, Measurement, Data Analysis & Probability
 - 5 Process Standards: Problem Solving, Reasoning & Proof, Communication, Connections, Representation
- c. Common Core State Standards for Mathematics (5 hours)
 - Content Standards and Domains in the Middle Grades
 - Eight Standards for Mathematical Practice

- d. Constructivism in the Mathematics Classroom (2 hours)
- e. Teaching through Problem Solving (2 hours)
- f. Instructional Tools for Middle Grade Mathematics: Technology & Manipulatives (5 hours)
 - Roles of Calculators, Dynamic Software, Appropriate Web-Sites, and Virtual Manipulatives
 - Concrete Commercial Manipulatives and Appropriate Alternatives
- g. Planning for Diverse Learners in the Middle Level Mathematics Classroom (5 hours)
 - The Three-Part Lesson Format
 - Writing Instructional Objectives
 - Differentiated Instruction in Mathematics – Multiple Entry Point Problems & Tiered Tasks
 - Accommodations & Modifications in the Mathematics Classroom
 - Response to Intervention in Mathematics Instruction
- h. Assessment of Mathematical Understanding in Middle Grades (6 hours)
 - Assessing Mathematical Processes & Dispositions
 - Assessing Conceptual & Procedural Understanding
 - Identifying Error Patterns & Misconceptions
- i. Common Core Content Standards and Domains in the Middle Grades: Pedagogical Content Knowledge of Number & Operations (12 hours)
 - Operations & Algebraic Thinking
 - Number & Operations in Base Ten
 - Number & Operations – Fractions
 - Ratio & Proportional Relationships
 - The Number System

Required Texts:

Van de Walle, J. A., Karp, K. S., & Bay-Williams, J. M. (2013). *Elementary and middle school mathematics: Teaching developmentally (8th edition)*. Pearson Education Inc.

NCTM (2010). *Teaching and learning mathematics: Translating research for elementary school teachers*. NCTM.

Common Core State Standards for Mathematics: <http://www.corestandards.org/the-standards/mathematics>

Daily Class Materials: Scissors, Pencil Crayons, Transparent Tape (like Scotch Tape), Ruler, White Cardstock for printing (and a color printer or access to a color printer), and access to a digital camera, scanner, and printer.

Math Manipulatives: Cuisenaire Rods, Base-10 Blocks, Color Tiles, 2-Color Counters, Pattern Blocks, Tangrams, and Fraction Circles

Recommended for candidates with Middle School Math Concentration (available for purchase online at www.nctm.org):

Chappell, M. & Pateracki, C. (2004). *Empowering the beginning teacher of mathematics: Middle school*. NCTM.

Mirra, A. (2009). *Focus in grades 6-8: Teaching with curriculum focal points*. NCTM.

Methods of Instruction:

A variety of methods of instruction will be employed. This class is designed to prepare candidates to teach mathematics in the grades 4 – 8 classroom; therefore the professor will model teaching techniques appropriate for the middle level mathematics classroom through web-based videos. Additionally, Power Point presentations, supplementary web-based lecture notes and commentary, assigned course readings, on-line class discussions, and computer laboratory work completed at various NCTM and virtual manipulative websites will be employed. Finally, candidates will be engaged in hands-on, manipulative activities which will be digitally photographed or video-taped and subsequently electronically submitted to the professor for review and informal/formative assessment.

Suggested Student Activities:

- **Article Questions:** For various topics, a journal article that relates to that topic will be assigned. You are to read each article and **thoroughly** answer the questions posted within the Assignments tab of MyCourses for the corresponding article. All answers to assigned article questions should be typed in a Word document and attached to the assignment submission, as with all assignments. These answers are to be submitted to the professor on or before the assigned due date – see individual Learning Module Agendas. All answers are to be professionally written in grammatically correct sentences. (Course Objectives: 1, 2, 5, 7)
- **TIAI Teacher Observations:** You are to watch 6 videos of middle school mathematics classes. While watching, you are to complete the two structured observations following specific instructions provided in the MyCourses Assignments tab. The observations are based on the communication, instruction, management, and assessment parts of the TIAI (Teacher Intern Assessment Instrument). On the due date, you are to submit the completed structured observation responses (including the corresponding TIAI indicators) using the format provided in the instructions as a Word document attached to your assignment submission. (Course Objectives: 2, 3, 4, 6, 7)
- **Midterm:** You will take a cumulative mid-term exam based on knowledge gained through class activities/discussions, textbook readings, and field experiences. You will be given 105 minutes to complete this assessment. This assessment is NOT open-book/open-notebook. (Course Objectives: 1, 2, 3, 7, 8)
- **One-on-One Teaching:** For this assignment, you will engage in an activity that allows you to put the knowledge and skills gained in this course to use while working with a middle school student. You must arrange to teach a middle school student (grades 4 – 8) of your choice in the area of **mathematics for 9 contact hours** (a contact hour means you're working with your student during that hour) – 3 hours a week for 3 weeks. After you determine who you will be teaching, you are to set times and dates that the teaching will occur, which reflect 3 hours a week for 3 weeks. This information, along with a signature of one of the student's parents, is to be submitted electronically to the professor by the "Teaching Schedule" deadline. Use the "Teaching Schedule" form provided in the MyCourses Assignments tab. **All teaching must be approved by the professor prior to engaging in it.** During the first hour, you will administer a pre-test to the student, provided by the professor. Then during the last hour of teaching you will administer, the

exact same test, as a post-test. You will complete 8 specific activities with your student during the 2nd through 9th hours which will be provided by the professor. Each time you meet with your student, you are to document the time, date and what was accomplished during each session (keep a running log of times, dates, and accomplishments) and have the student sign it each time that you meet just before you leave. Use the “Time Documentation” form provided in the MyCourses Field Experience folder. The total amount of time shown on this log must be at least 9 hours. This log is to be electronically submitted to the professor with the hourly and final reports. For each hour of teaching, you are to complete an Hourly Report of Teaching using the prompts provided by the professor – see MyCourses Field Experience folder. Upon completion of the project, you are to electronically submit, the Time Documentation form, 9 Hourly Reports, a reflective Final Report (at least three pages and no more than 5 double-spaced, typed pages) describing this experience (including error analyses of the errors made by your student, and pre- and post-test scores) – see the MyCourses Field Experience folder for Final Report prompts. You are also to submit to the professor ALL ORIGINAL work of the student, via U. S. Postal system, UPS, or delivery in person. (Course Objectives: 3, 4, 6, 8)

- **Error Diagnosis & Tasks:** Each partner group will be given student work samples to evaluate. You will identify all of the errors in the student’s work, identify misconceptions, and then locate an activity on the National Library of Virtual Manipulatives website which would facilitate a conceptual understanding of concepts underlying each of the student’s errors and misconceptions. You and your partner will submit (1) a description of the activities/tasks with an explanation for why each addresses the student’s errors and misconceptions; and (2) documentation of the errors and misconceptions identified within the student work samples. (Course Objectives: 2, 3, 4, 6, 8)
- **Activity Presentation:** You and your assigned partner will be assigned one of the 5 NCTM Process Standards. Working together, you are to find an appropriate Standards-Based activity, which is NOT dependent on technology, from a lesson found on the NCTM Illuminations website (www.Illuminations.nctm.org) that could be used to promote your assigned Process Standard. Then you and your partner will present this activity to the class by posting a Power Point Presentation, the activity handouts to be completed by all classmates, and a set of 3 follow-up reflective discussion prompts about the activity within the Discussion Board of MyCourses (see “Activity Presentations” on Discussion Board). Besides the Discussion Board posting, the required components of this assignment, which will be submitted to the professor through the Assignments tab, include (a) a **Word document** containing an explanation/rationale for why the activity you selected promotes your assigned Process Standard and an explanation of which of the Common Core State Standards for Mathematical Practices are being addressed within the activity; and (b) a **Power Point presentation** to be included with the documents uploaded in the Discussion Board as part of the presentation which states (1) the name of the activity, (2) the NCTM Process Standard that is being promoted by the activity with the **specific indicators** being addressed, (3) the NCTM Content Standard and **specific indicators** being addressed, (4) the specific Common Core Standards for Mathematical Practices being addressed, (5) the Common Core State Standards for Mathematics Content being addressed, (6) the specific daily instructional objective(s) being addressed by the activity, (7) the required materials needed to complete the activity (from a student’s perspective), (8) specific “student-friendly” directions for completing the activity, (9) a

description of what the students are to complete as a final product resulting from completing the activity (classmates will submit this to the professor), and (10) a set of 3 follow-up “student-friendly” discussion prompts/questions based on the mathematical content of the activity that classmates will respond to within the Discussion Board once they complete the activity. After reading all of your classmates’ responses to the 3 discussion prompts, you are to submit a reflection using the prompts provided within the Assignments tab of MyCourses by the reflection due date. You are to also complete all of your classmates’ activities and meaningfully respond to their discussion prompts, as part of this assignment. You will submit the completed activity sheets/activity requirements to the professor via the Assignments tab in MyCourses. Points will be deducted for responses that aren’t thorough and/or do not reflect a solid understanding of the activity completed. (Course Objectives: 1, 2, 3, 4, 8)

- **Research-Based Lesson Plan Project:** Based on an assigned content topic, each partner group will be responsible for locating two research journal articles describing current research-findings on that topic and one “how-to teach that topic” practitioner-based journal article from an NCTM published journal (namely, *Teaching Children Mathematics* or *Mathematics Teaching in the Middle School*). After reading all 3 journal articles, you are to (1) write a summary paper synthesizing and explaining the content of the three articles; (2) create a lesson plan using the Basic Lesson Plan Format in TaskStream, which implements the activity published in the “how-to-teach-the-content” article and uses effective research-based pedagogy as described in the research articles; and (3) individually, write a reflection detailing what was learned by completing this project (see specific reflection prompts in MyCourses within the Assignments tab). You are to submit the completed summary paper; lesson plan, including separate attachments of all handouts, assessments, scoring keys (grading keys), and any other materials necessary to implement the lesson plan; and the individual reflection to the professor electronically via the Assignments tab. The lesson plan will be written using the Basic Lesson Plan Format of Taskstream (all components are to be completed), and will include a maximum of 2 instructional objectives (1 objective preferably) and the procedures’ subheadings discussed during class (Management, Introduction, Before Problem Solving, During Problem Solving, After Problem Solving, Assessment, and Closure). *Teaching Children Mathematics can be found at the MSU library; Contact your professor if you need an article from Mathematics Teaching in the Middle School.* not found in the MSU library. Contact Ms. Rachel Cannady at rcannady@library.msstate.edu for assistance at the MSU library. A minimum of one assessment that is **NOT a checklist or rubric** (i.e. it should be a traditional assessment) must be used just prior to the closure of the lesson to assess students’ attainment of ALL lesson objectives stated in the lesson plan. You are to also provide a narrative detailing the contributions to this project by each group member and it should be signed by each group member. Documents are to be scanned and PDFs created as needed such that all parts can be attached through the Assignments tab of MyCourses by EACH member of the partner group. (Course Objectives: 2, 3, 4, 5, 7, 8)
- **Individual Assignments/Activities and Participation:** You will complete various activities aligned with the course topics throughout the semester (as described in MyCourses Assignments). All assignments/activities must be completed in order to receive a grade in this course. Evidence of the completion of each Learning Module’s activities will be through either digital pictures, discussion board posts, or completion of recording sheets submitted electronically to the professor through the Assignments tab of

MyCourses. All documents submitted are to be either PDFs of Word documents or PDFs from scanned documents. No other types of documents are accepted. (Course Objectives: 1, 2, 3, 4, 5, 6, 7, 8)

- **POD Journal:** You are to maintain an electronic POD (Problem of the Day) problem solving journal within the discussion board area of the course which contains (1) a typed statement of each of the PODs given on the first slide of each daily Power Point; (2) your solution to that POD, including all work/computations which led to the answer; and (3) a written explanation of **how** you derived your solution and **why** you did what you did to solve the POD, in complete sentences within two separate paragraphs. The POD journal is an **individual** course requirement and as such, the contents of your POD journal should be original work. Full credit will not be given if no written explanation is provided. (Course Objectives: 3, 4, 6)
- **Final Exam:** You will take a cumulative written final exam based on knowledge gained through class activities/discussions, textbook readings, and field experiences. You will be given 120 minutes to complete this assessment. This assessment is NOT open-book/open-notebook. (Course Objectives: 1, 2, 3, 7, 8)

Honor Code:

Mississippi State University has an approved Honor Code that applies to all students. The code is as follows:

“As a Mississippi State University student I will conduct myself with honor and integrity at all times. I will not lie, cheat, or steal, nor will I accept the actions of those who do.”

Upon accepting admission to Mississippi State University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning, and to follow the philosophy and rules of the Honor Code. Students will be required to state their commitment on examinations, research papers, and other academic work. Ignorance of the rules does not exclude any member of the MSU community from the requirements or the processes of the Honor Code.

For additional information visit: <http://students.msstate.edu/honorcode>

Please note that **Plagiarism** is defined and clarified within the honor code as follows:

1. **Plagiarism:**

The appropriation of another person's ideas, processes, results, or words without giving appropriate credit.

Clarification:

- a. Intentionally, knowingly, or carelessly presenting the work of another as one's own (i.e., without proper credit).
- b. Failing to credit sources used in a work product in an attempt to pass off the work as one's own.
- c. Attempting to receive credit for work performed by another, including papers obtained in whole or in part from individuals or other sources.

- d. The internet, data bases and other electronic resources must be cited if they are utilized in any way as resource material in an academic exercise.

General information pertaining to plagiarism:

- a. Faculty members are responsible for identifying any specific style/format requirement for the course. Examples include, but are not limited to, American Psychological Association (APA) style and Modern Languages Association (MLA) style.
- b. Direct Quotation: Every direct quotation must be identified by quotation marks or appropriate indentation and must be properly acknowledged in the text by citation or in a footnote or endnote.
- c. Paraphrase: Prompt acknowledgment is required when material from another source is paraphrased or summarized, in whole or in part, in one's own words. To acknowledge a paraphrase properly, one might state: "To paraphrase Locke's comment,..." and then conclude with a footnote or endnote identifying the exact reference.
- d. Borrowed facts: Information gained in reading or research, which is not common knowledge, must be acknowledged.
- e. Common knowledge: Common knowledge includes generally known facts such as the names of leaders of prominent nations, basic scientific laws, etc. Materials, which add only to a general understanding of the subject, may be acknowledged in the bibliography and need not be footnoted or endnoted.
- f. Footnotes, endnotes, and in-text citations: One footnote, endnote, or in-text citation is usually enough to acknowledge indebtedness when a number of connected sentences are drawn from one source. When direct quotations are used, however, quotation marks must be inserted and acknowledgment made. Similarly, when a passage is paraphrased, acknowledgment is required.

Technology:

Technology will be used in both the delivery of the course content and through course requirements completed by teacher candidates. Delivery of the course will be web-based through the Internet and therefore, delivery of the course content will utilize Power Point Presentations, supplementary web-based lecture notes and commentary, on-line class discussions, and computer laboratory work completed at various NCTM and virtual manipulatives websites. All course assignments will be completed using appropriate software tools. Finally, teacher candidates will be engaged in hands-on, manipulative activities which will be self-video-taped, as appropriate, and subsequently electronically submitted to the professor for review and informal/formative assessment. The technology requirements of the course are as follows:

- Computer with High Speed Internet Access via DSL or equivalent broadband connectivity option (traditional dial-up Internet services do not provide adequate support to the technologies used within the course)
- Required Browser: Mozilla Fire Fox (Version 3 or higher); verify that your browser is supported by using the Check Browser feature in MyCourses
- Download the latest version of Adobe Acrobat Reader; this can be downloaded at <http://get.adobe.com/reader/otherversions/>
- Download Adobe Media

- Download Adobe Flash
- Download Shockwave Flash
- Download or upgrade to the latest version of Java
- Download Quicktime Player; this can be downloaded at <http://www.apple.com/quicktime/download/>
- Download the “Lockdown Browser” in order to complete assessments
- All Pop-Ups must be turned OFF when using MyCourses
- To check your Browser, click on “Check Browser” in the top right corner of the course listings page after you log in to MyCourses. You must have a GREEN check on each item listed BEFORE beginning your course.
- Frequent access to a digital camera and scanner. You will need to be able to take digital pictures of the results of most of the class activities then submit them to your professor within PDF-Word documents so they can be viewed and evaluated. You will also need to be able to scan documents and convert them to PDFs to then submit to the professor.

Diversity:

Diversity is one of the main topics of the course content. It will be discussed as part of the Equity Principal and in terms of appropriate mathematics instructional and assessment strategies to meet the needs of diverse learners.

Disability:

In accordance with section 504 of the 1973 Rehabilitation Act and the Americans with Disabilities Act, Mississippi State University reasonably accommodates students who demonstrate, through appropriate documentation, a qualified disability. The department of Student Support Services (SSS) is the designated unit on campus where students with disabilities identify themselves when requesting academic accommodations. For additional information, contact SSS at 325-3335.

Field Component:

The course will have a field component which will allow teacher candidates to participate in structured observations of middle level mathematics teachers and to work one-on-one with local middle school students in both enrichment and Response to Intervention activities. The specific field requirements for each assignment are previously described under “Suggested Student Activities”.

Evaluation of Student Progress:

This course uses a grading scale of 1000 points. The points needed for each letter grade are detailed below. In this graduate level course, earning an “A” will require a demonstration of mastery of the course objectives. A “B” represents quality, acceptable work. Grades will be determined by the points earned in both academics and fieldwork. No late work will be accepted for credit in EDE 8123 regardless of point value.

Grading Scale:

1000-930 pts = A
929-860 pts = B
859-790 pts = C
789-700 pts = D
699 pts & below = F

COURSE ASSIGNMENTS/ACTIVITIES

Article Questions (8 @ 20 points)	160 pts (Individual)
Mid-term Exam	120 pts (Individual)
TIAI Teacher Observations (2 @ 15 points)	30 pts (Individual)
Teaching (9 Hours) & Reports	105 pts (Individual)
Error Diagnosis & Task	30 pts (Individual)
Activity Presentation	75 pts (Small Group)
Reflection for Activity Presentation	15 pts (Individual)
Research Lesson Plan Project	75 pts (Small Group)
Individual Activity Assignments & Participation	220 pts (Individual)
Problems of the Day (10 @ 4 pts each)	40 pts (Individual)
Final Exam	120 pts (Individual)
Professional Dispositions	10 pts (Individual)
Total Points	1000 pts

ATTENDANCE POLICY

All candidates are required to complete each learning module according to the deadlines set on the course web-site and course calendar. Additionally, all candidates are expected to meet all field experience requirements. This includes teaching a middle school student for 9 contact hours, for EDE 8123, with an approved teaching schedule. Other field experience requirements are completion of two structured observations. **All assignments, including daily class activities, must be completed and submitted to the instructor in order to pass the course with a “C” or higher.** Candidates cannot choose to opt out of an assignment; i.e. all assignments and courses activities must be submitted to the professor, regardless of the number of points to possibly be earned.

RESPECT/COURTESY/NETIQUETTE

Candidates will treat each other and the professor with respect and courtesy. Communication in online courses is different than in face to face courses. Please maintain appropriate netiquette; e.g. class etiquette in virtual classrooms. These basic rules should be adhered to:

1. Remember that you’re not exchanging ideas with a computer but other people – your classmates and your instructor.
2. Avoid “shouting,” that is, typing in all caps or using excessive exclamation points. It is usually not received well.
3. Do not “flame”, that is, send angry or confrontational email. Discussions and debates should remain calm and respectful. Avoid saying anything that you would not say to someone in person.
4. Respect others’ privacy. Do not forward personal messages sent to you.
5. Be conservative in forwarding anything to others. Make sure it’s relevant to the discussion.
6. Be considerate of others’ time.

7. Be forgiving of others' mistakes. Some individuals may have less experience than you.
8. Do not post personal postings (i.e., My band is playing at Rick's Friday night. Hope you'll come). All postings should be directly related to course content.
9. Do not use internet/texting acronyms (i.e., LOL). Everything should be communicated in Standard English, using correct grammar and complete sentences.

Bibliography:

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