MOLLOY COLLEGE
GRADUATE EDUCATION

Cognition and Culture in STEM Education

(3 credits)

Catalogue Description:

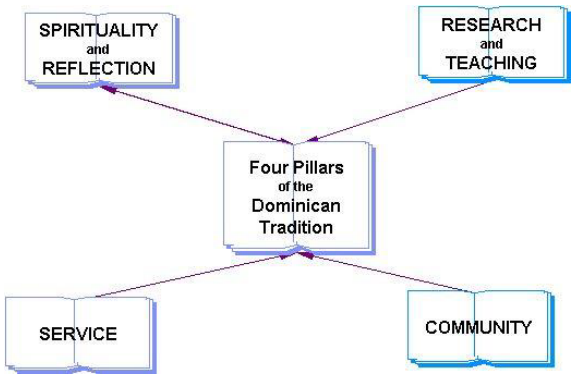
This course is designed to teach teachers to integrate learning theory and effective practices for engaging students. Teachers will reflect on their own STEM teaching and learning and make connections to relevant education theory and literature. This course also focuses on using cognitive and cultural frameworks in developing STEM pedagogy to make it more accessible to underrepresented demographic groups.

Shared Vision

The Molloy College Teacher Education faculty has derived its vision for the exemplary teacher from the College's mission statement, the four pillars of the Dominican tradition, comments and input from the Professional Education Unit's Advisory Board and degree candidates as well as numerous faculty discussions rooted in the department's knowledge base which undergirds the initial and advanced programs' curriculum, pedagogy, and values.

The teaching professionals, both undergraduate and graduate teacher candidates, who complete Molloy's teacher preparation programs are distinguished by their ability to exemplify and promote core values in their own teaching. These values include:

- Belief that all children can learn
- Learner centered and value-centered curriculum and pedagogy
- Ethics and spirituality
- Intellectual curiosity
- Independence and risk taking, while promoting collective identity and responsibility
- Diversity, multiculturalism and pluralism, including divergent thinking
- Passion for teaching
- Commitment to students and their communities



- Civic responsibility through the promotion of social justice and interdependence
- Commitment to democracy

Course Objectives

The teacher will be able to:

- Develop awareness of the intellectual, social, cultural diversity of STEM students and begin thinking about differentiate instruction using cognitive strategies
- Develop ways to make STEM more accessible and achievable in demographic groups that are underrepresented in STEM education and careers.
- Analyze barriers to STEM education for underrepresented groups and design programs and ways to overcome the barriers.
- Design authentic STEM assessments
- Understand the use of culturally relevant STEM pedagogy

Topics to be covered:

- Questioning Strategies and Question Types in Inquiry-based Learning
- Motivation and Cooperative Learning
- Misconceptions in STEM and Conceptual Change
- Metacognition
- Cognitive Load
- Memory
- Culturally Relevant Pedagogy

Required Materials

Dori, Y. J., Mevarech, Z., & Baker, D. (2018). *Cognition, Metacognition, and Culture in STEM Education*. Cham, Switzerland: Springer.

Course Requirements and Evaluation

1.	Design a cognitive intervention	30%
2.	Create and present a culturally-relevant STEM lesson (group assignment)	20%
3.	Review a cognitive strategy	20%
4.	Module assignments/canvas discussions	20%
5.	Class participation	10%
	Total	100%

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LATE ASSIGNMENTS WILL RESULT IN LOWERING THE GRADE BY 10%.

Assignments Explained

1. **Design a cognitive intervention (30%)**

Using cognitive strategies you learn about in the course, design an intervention for your STEM classroom. The intervention must include:

- Theoretical background on the cognitive science behind the intervention
- Materials: list any materials, technology, etc that is needed to implement the intervention
- Description: Describe what students do and what teacher do in the intervention.
- Desired outcomes / assessment: Describe how you will measure that students have made the desired connections and developed understanding as a result of the intervention. Describe the actions you will take for students who do not demonstrate understanding. How will you differentiate?

2. **Create and present culturally-relevant STEM lesson (20%)**

Develop a new lesson or modify an existing lesson that uses culturally-relevant practices.

Lesson plan must be in the 5E format and include:

- Topic/Title of the Lesson
- Grade level
- NGSS & CCSS Standards addressed in each STEM discipline (including others, i.e. social studies, physical education, etc. is welcomed)
- Measurable behavioral objectives (Webb's DOK is recommended)
- Lesson Procedures – What will teacher do? What will student do in each of the 5E's?
- Assessments – May be included in the evaluate. Make sure your assessments are aligned to your behavioral objectives.
- Include everything you need to implement the lesson (student worksheets, rubrics, materials list for labs/activities, etc.)

3. **Review a cognitive strategy (20%)**

Use a pedagogical lens to review a cognitive strategy: Metacognitive Monitoring, Backward Design, Problem-Based Learning, or Collaborative-Based Learning,

4. **Module assignments /Canvas discussions (20%)**
   A variety of module assignments including Canvas discussions will be required throughout the semester.

5. **Attendance/Participation in online assignments (10%)**
   Completion of all required readings and assignments as well as active participation is expected of all teachers.

NOTE: Assignments submitted after the due date will lose 10% for each week that it is late.

Academic Integrity Statement

The college maintains and affirms a strong policy of academic honesty. Every member of the academic community has a duty neither to cheat nor to condone cheating, fabrication, plagiarism, or facilitation of academic dishonesty. Academic infractions are subject to disciplinary action as described in the Graduate Education catalog.

Accommodations

Molloy College makes a commitment to providing reasonable accommodations for any student with a documented disability or chronic illness. Like so many things this semester, the need for accommodations and the process for arranging them, may be altered by COVID-19.
Students requiring accommodations in order to fully participate in this class are urged to contact Disability Support Services (DSS/STEEP) at **dss@molloy.edu**, as soon as possible.

APA Manuscript Style

All manuscripts in the field of education are written in the style format of the American Psychological Association.

Students in the Graduate Education Programs are required to purchase the Publication manual of the American Psychological Association (2020).

Attendance Policy

In the case of any absence, please email the professor prior to class.

As professionals in your field, you are expected to attend each class session, to be present when

it begins, to come prepared for class, and to participate productively in whole-class and small-group activities. Professionalism and respect are expected in classroom participation. Professional behavior includes turning off and stowing cellphones, refraining from outside conversation or activities (including Internet surfing, text messaging, or preparing for other classes/activities), and being a thoughtful and active listener.

Students are expected to attend classes regularly and punctually. For every absence after the third absence, your grade will be reduced by one-half letter grade for this class; e.g. a B+ become a B. Be advised that attendance will be taken at the beginning of each class. Students who arrive to class late are responsible for reminding the instructor to change the attendance for absent (A) to late (L). Three late class arrivals will officially count as one absence in determining your grade for this class.

It is the accepted practice at Molloy College that faculty take attendance in all courses.

- Students should notify faculty if an absence is necessary as the result of a serious situation.
- Failure to attend class for two (2) consecutive weeks at any point in the semester, without notification of extenuating circumstances, will result in an administrative withdrawal from the course.
- In the case of an online or hybrid course, attendance is considered similarly important. Therefore, failure to participate in academic activities in any given week is considered an absence.
    - Examples of participation in academic activities representing attendance would be
        - participation in a class chat or discussion board on an academic topic,
        - submission of a required assignment,
        - digital interaction with the professor on an academic topic,
        - and completion of a quiz or exam.

Administrative withdrawal results in removal from the course with a grade of "WA" or WF" determined by the point in the term and the academic performance. Students should consult the College catalog for complete details regarding withdrawals and the potential financial implications of a withdrawal.

Chalk & Wire Account

All teacher are required to upload benchmark performance assignments to their Chalk and Wire account. Upon admission to Graduate Education Programs all students are required to pay a fee for their Chalk and Wire account by registering for EDU 5010 at the beginning of their program. It is a one-time fee. There is no need to register for a Chalk and Wire account more than once.

Class Participation

Active class participation is expected of all teachers. As future teachers, it is expected that you will be interested in the course topics, and that you will share ideas, questions, and observations

(from the field, if applicable) in each module. Only those teachers who share ideas, comments, and observations in each module and demonstrate their knowledge of the course readings and content, will have the possibility of receiving a 9 or 10 for the class participation score.

Communicating Across the Curriculum:

Communicating across the curriculum requirements are satisfied by:

- Module Assignments 10%
- Interview with a STEM professional 20%
- Connecting the Standards (CCSS-M, Next Gen Science, ISTE) 20%
- Create and present a design challenge aligned to CCSS-M 20%
- Design a problem-based mathematics/STEM Unit 20%

Diversity Statement

This course will highlight diversity in the following ways:

- use their knowledge of student diversity to affirm and support full participation and continued study of mathematics/STEM by all students;
- in nearly all discussions about teaching and learning;
- adherence to multi-modality lesson design that complies with learning standards and evidence within the written and presented lesson plan;
- demonstration of lessons that are interdisciplinary and subject-specific in accordance with: lessons, unit plans, and individual presentations, discussions about children with special needs, giftedness, and the evaluation procedures for diverse learners.
- diversity includes gender, culture, ethnicity, socioeconomic background, language, special needs, and mathematical learning styles.

E-mail Policy

It is mandatory that every candidate have a Molloy College e-mail account and check it daily. Information re: the programs as well as communication from course professors utilize this media. This Molloy e-mail account must be activated immediately. If not utilized within 30 days, the account becomes defunct and needs to be reinstated.

Information Literacy Statement

Information literacy is a set of abilities requiring individuals to "recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information." Information literacy also is increasingly important in the contemporary environment of rapid technological change and proliferating information resources. Because of the escalating complexity of this environment, individuals are faced with diverse, abundant information choices--in their academic studies, in the workplace, and in their personal lives. Information is

available through libraries, community resources, special interest organizations, media, and the Internet--and increasingly, information comes to individuals in unfiltered formats, raising questions about its authenticity, validity, and reliability. In addition, information is available through multiple media, including graphical, aural, and textual, and these pose new challenges for individuals in evaluating and understanding it. The uncertain quality and expanding quantity of information pose large challenges for society. The sheer abundance of information will not in itself create a more informed citizenry without a complementary cluster of abilities necessary to use information effectively.
Information literacy forms the basis for lifelong learning. It is common to all disciplines, to all learning environments, and to all levels of education. It enables learners to master content and extend their investigations, become more self-directed, and assume greater control over their own learning.

An information literate individual is able to:
Determine the extent of information needed;
Access the needed information effectively and efficiently;
Evaluate information and its sources critically;
Incorporate selected information into one's knowledge base;
Use information effectively to accomplish a specific purpose; and
Understand the economic, legal, and social issues surrounding the use of information, and access and use information ethically and legally.
American Library Association (Chicago: American Library Association, 1989).

This course will address Information Literacy in the following ways:

- Combine existing information and original thought – Interview with a STEM professional, Design a problem-based mathematics/STEM Unit, Module Assignments
- Create a system for organizing information – Interview with a STEM professional, Design a problem-based mathematics/STEM Unit
- Integrate new information with previous knowledge – Interview with a STEM professional, Design a problem-based mathematics/STEM Unit, Module Assignments
- Extend initial synthesis to construct new hypotheses – Create and present a design challenge aligned to CCSS-M
- Recognize cultural, physical, or other contexts – Module Assignments, Interview with a STEM professional, Create and present a design challenge aligned to CCSS-M, Design a problem-based mathematics/STEM Unit
- Cite sources in an appropriate style – Module Assignments, Interview with a STEM professional, Connecting the Standards (CCSS-M, Next Gen Science, ISTE), Create and present a design challenge aligned to CCSS-M, Design a problem-based mathematics/STEM Unit

Recordings

As a student enrolled in courses offered by Molloy College, Rockville Centre, New York, I understand that classes may sometimes be audio or digitally captured for instructional

purposes. THESE RECORDINGS ARE INTENDED ONLY FOR EDUCATIONAL PURPOSES AND WILL BE USED ONLY BY THE FACULTY AND STUDENTS ENROLLED IN THE COURSE. PLEASE NOTIFY YOUR INSTRUCTOR BY EMAIL IF YOU DO NOT CONSENT TO PARTICIPATION IN A DIGITAL RECORDING OF YOUR COURSE.
If no student elects to withhold his/her consent prior to _____, digital recording of the class will begin on _____. Any student who has not contacted the professor prior to that date will be deemed to have consented to the recording. You may notify your professor by email at any time if you choose to revoke your consent.

Technology Statement

This course will highlight technology in the following ways:

- use appropriate technology to support the learning of mathematics including, but not limited to, computers and computer software, smart board, calculators, interactive television, tablets, distance learning, electronic information resources, and a variety of relevant multimedia
- use a variety of print and electronic resources
- submission of Chalk & Wire assignment

The Respectful Classroom

A major determinant of an effective teacher involves positive dispositions. It is expected that teacher will recognize and contribute to a mutually respectful classroom, both in word and deed. All cell phones and other hand-held or electrical devices **MUST** be turned off prior to the beginning of each class, put away, and kept off during class. An exception to this rule is if these devices are being used as part of the class. Teacher are not to leave class to receive or send telephone, text, other messages, or to use other devices.

Student Personal Counseling Center

The Student Personal Counseling Center (SPCC) is a confidential and free service available to all currently enrolled Molloy College students. Through individual counseling, wellness workshops, crisis intervention, support groups, and on-campus trainings, the SPCC aims to enhance wellness, and offer students a more meaningful, and successful college experience. If you are interested in scheduling an appointment, please call 516-323-3484 Monday-Friday from 9am-5pm. The SPCC is located in Public Square 030.

Workshop Policy for the Graduate Program-Attendance at Professional Workshops and Conferences

- Participation in professional workshops and conferences is an integral part of being a well-informed teacher. All teacher are required to attend one Molloy College sponsored workshop/conference each semester. These conferences are presented by Nassau Reading Council, Phi Delta Kappa, Molloy Chapter of Kappa Delta Pi, etc.

- Workshops and Conferences which teachers are required to attend as part of their teaching contractual obligations (such as Superintendent's Conference Days and district sponsored conferences) do not fulfill this Molloy College requirement.
- Workshops in Dignity for All Students (DASA) Training**,** Training in the Identification and Reporting of Child Abuse and Neglect, Principles of Chemical Dependency and School Violence Prevention and Intervention required by New York State Education Department for teacher certification do not fulfill this Molloy College requirement.

Zoom in the Classroom

Zoom is a video conferencing tool where instructors and students can meet online at the same time to interact in academic activities such as classroom lectures, student presentations, screen sharing and discussions. Zoom is often utilized with online synchronous courses at Molloy.

Minimizing Distractions During Synchronous Online Class

Zoom, or conferencing sessions, can be impacted by many different environmental or situational variables. Here are some strategies and suggestions for minimizing such impact:

- Students should mute their microphone when they are not speaking.
- Consider using virtual backgrounds, which display the participant but mask the area behind them.
- Students should not watch videos, listen to music, or use other applications (other than note taking apps) while attending class. Doing so could not only distract the class but lead to a degradation in computer performance that may affect the student viewer experience.
- Student can use the chat feature in Zoom to communicate with the entire class and or the instructor but should not be participating in one-to-one chats with their peers during class.

Student Reminders and Etiquette

- Just as in an on-campus classroom, it is important to make the best virtual impression during a Zoom meeting.
- You may be viewable, or heard, by the entire class during a Zoom session and should conduct yourself accordingly.
- Classes may be recorded by the Instructor (see the **Recordings** section of this course outline for further information).
- Student recordings are only permitted if all participants are fully informed that the recording will take place and all participants consent to being recorded. Please refer to the Molloy Student Handbook for more details.
- Dress as if you are in a classroom setting.
- Students are expected to uphold Molloy College's Academic Honor Pledge.
- Abide by the Civility Policy found in the Molloy Student Handbook.