

RHODE ISLAND COLLEGE
Feinstein School of Education and Human Development
Department of Special Education

SPED 558: MATH/ SCIENCE FOR STUDENTS WITH DISABILITIES

Course Description:

Course focuses on strengths and needs of learners. Participants analyze math and science content, tasks, frameworks and standards. Activities are designed and adapted to support Math and Science student learning at all levels of education.

Extended Course Description:

This course focuses on learning strengths and needs of learners with disabilities. Local, state, and national content standards are used. Participants analyze math and science tasks, design and adapt classroom activities through the use of technology and other devices, and support student learning as stipulated in the student's individual educational plan (IEP).

PREREQUISITES:

Graduate status or consent of department chair.

Required Text:

Berch, D.B. & Mazzocco, M. M. (2007). *Why is Math so Hard for Some Children?: The Nature and Origins of Mathematical Learning Difficulties and Disabilities*. Baltimore, MD: Paul Brookes.

National Science Foundation. (2000). *In Foundations Vol. 2. An introduction to inquiry*. National Science Foundation. (NSF 99-148). Access at <http://www.nsf.gov/pubs/2000/nsf99148/pdf/nsf99148.pdf>

Recommended Text:

Allsop, D.H., Kyger, M.M., Lovin, L.H. (2008). *Teaching Mathematics Meaningfully: Solutions for Reaching Struggling Learners*. Baltimore, MD: Paul Brookes.

COURSE GOALS IN RELATIONSHIP TO STANDARDS

This course relates most directly to the following Council for Exceptional Children, Rhode Island Professional Teacher Standards, and FSEHD Advanced Competencies:

Conceptual Framework/Advanced Competencies	Rhode Island Professional Teacher Standards		CEC Standards	
KNOWLEDGE: <i>Domain-Specific</i>	#1	Teachers create learning experience using a broad base of general knowledge that reflects an understanding of the nature of the world in which we live.	CEC 1	Foundations
PRACTICE: <i>Evidence-Based Decision Making</i>	#2	Teachers create learning experiences that reflect an understanding of the central concepts, structures, and tools of inquiry of the disciplines they teach.	CEC 7	Instructional Planning
KNOWLEDGE: <i>Domain-Specific</i>	#3	Teachers create instructional opportunities that reflect an understanding of how children learn and develop.	CEC 2	Characteristics of Learners
PRACTICE: <i>Diversity of Practice</i>	#4	Teachers create instructional opportunities that reflect a respect for the diversity of learners and an understanding of how students differ in their approaches to learning	CEC 3	Individual Learning Differences
KNOWLEDGE: <i>Domain-Specific</i>	#5	Teachers create instructional opportunities to encourage students' development of critical thinking, problem solving, and performance skills.	CEC 4	Instructional Strategies
KNOWLEDGE: <i>Domain-Specific, Contextual Perspective</i>	#6	Teachers create a learning environment that encourages appropriate standards of behavior, positive social interaction, active engagement in learning, and self-motivation	CEC 5	Learning Environments & Social Interactions
PRACTICE: <i>Technology Use</i>	#8	Teachers use effective communication as the vehicle through which students explore, conjecture, discuss, and investigate new ideas.	CEC 6 CEC 4	Language Instructional Strategies
PRACTICE: <i>Evidence-Based Decision Making</i>	#9	Teachers use a variety of formal and informal assessment strategies to	CEC 8	Assessment,

		support the continuous development of the learner.		
KNOWLEDGE: <i>Contextual Perspective</i>	#3	Teachers create instructional opportunities that reflect an understanding of how children learn and develop.	CEC 3	Individual Learning Differences
PRACTICE: <i>Professional Identity Development</i>	#10	Teachers reflect on their practice and assume responsibility for their own professional development by actively seeking opportunities to learn and grow as professionals.	CEC 9	Professional and Ethical Practices
PRACTICE: <i>Evidence-based Decision Making</i>	#7	Teachers foster collaborative relationships with colleagues and families to support students' learning.	CEC 10	Collaboration
PRACTICE: <i>Professional Identity</i>	#11	Teachers maintain professional standards guided by legal and ethical principles.	CEC 9	Professional and Ethical Practices

COURSE OUTCOMES:

1. Demonstrate understanding of a reflective approach to professional practice
Knowledge: Domain-Specific Knowledge; CEC #9: Professional & Ethical Practice (RIPTS 1 & 10)
2. Recognize and honor cultural and linguistic diversity of students and capitalize on strengths to enhance math and science learning. **Practice: Diversity of Practice**; CEC 2 & 3: Development and Characteristics of Learners, Individual Learning Differences (RIPTS 3 & 4)
3. Demonstrate knowledge of constructivist theory and consider their understanding in order to teach math and science content. **Knowledge: Domain-Specific Knowledge**; CEC #1: Foundations; (RIPTS 2 & 8)
4. Assess performance using various tools and approaches in order to design developmentally appropriate learning experiences. **Practice: Professional Identity**; CEC #4 & 8: Instructional Planning, Assessment; (RIPTS 9)
5. Employ different instructional approaches and diverse materials to support student learning. **Practice: Evidence Based Decision Making**; CEC #4: Instructional Strategies; (RIPTS 3)
6. Use knowledge of Math and Science curriculum standards to design appropriate lessons for students with and without mild to moderate disabilities. **Knowledge: Domain Specific**; CEC #5 & 8: Learning Environments & Social Interactions, Assessment; (RIPTS 2)
7. Integrate Math/Science learning experiences along with assessment data to consider IEP performance levels, goals, and objectives. **Practice: Evidence-Based Decision Making; Diversity of Practice**; CEC #2 & 8: Individual Learning Differences, Assessment (RIPTS 5 & 6)

8. Learn, evaluate, and utilize various technology tools that support Math and Science learning and exploration. **Knowledge: Information Literacy, Practice: Technology Use;** CEC #4: Instructional Strategies; (RIPTS 1 & 2)
9. Consider positive ways to engage families in their children's learning of Math and Science content. **Practice: Diversity of Practice;** CEC #10: Collaboration; (RIPTS 7)
10. Consider the benefits of professional membership in Math and Science organizations to support their own professional growth. **Practice: Professional Identity Development;** CEC #9: Professional & Ethical Practice; (RIPTS 11)

COURSE REQUIREMENTS:

1) Readings/In class and online Participation

Teacher candidates will be required to readily participate in discussion both in person and online as needed.

2) Math/Science Autobiography

Teacher candidates will be asked to complete a 2-3 page autobiographical account of their memorable (including both positive and negative) experiences learning math and science in elementary through high school.

3) Math/Science Interview Project

Teacher candidates will be asked to observe students participating in math and science classes. They will identify one student to interview as they solve a particular math problem or conduct a science experiment at different intervals. Based on data gathered about student performance they will then design strategic interventions that they could use to teach that student a concept, procedure, and/or set of skills.

4) Curricula Review/Presentation

Teacher candidates will choose one Math or Science curriculum to review. They will be asked to critique the strengths/challenges of the curriculum for students with and without disabilities. A list of possible accommodations to use with the curriculum will be part of this assignment. A brief presentation with a respective handout for classmates will be required.

5) Research Journal Review

Teacher candidates will choose one research article about Math or Science that relates to students with disabilities and write a 2-4-page reflection. The first part will analyze the merits of the research, while the second section will focus on the teaching applications and overall usefulness in your work with students.

6) Take Home Exam

Class discussion and readings of course content will culminate with a take home exam at the end of the semester.

PERFORMANCE ASSESSMENT & STANDARDS

ASSESSMENTS	COURSE OUTCOMES	RIPTS	CEC STANDARDS	CONCEPTUAL FRAMEWORK
In Class and Online Participation	#1-10	#1-6, 9-11	#1-5, 8-10	Knowledge: Contextual Perspective, Professional Awareness, Practice: Professional Identity
Math/Science Autobiography	#1, 3, 7	#4, 7, 9, 11	#2, 3, 9	Knowledge: Contextual Perspective, Professional Awareness, Practice: Professional Identity
Research Journal Review	#1, 3, 7	#1, 2	#1, 2	Knowledge: Domain-Specific, Information Literacy; Practice: Evidence-based Decision Making, Professional Identity
Math/Science Interview (Course Artifact)	#2, 4, 5, 7	#3-6, 9, 11	#2-5, 8, 9, 10	Knowledge: Domain-Specific, Information Literacy; Practice: Evidence-Based Decision Making, Professional Identity
Curricula Review/Presentation	#3, 5, 6, 8	#4, 6, 7, 9	#4, 7, 8, 9	Knowledge: Domain-Specific, Information Literacy; Practice: Evidence-based Decision Making
Take Home Examination	#3, 6	#1, 2	#1, 2	Knowledge: Domain-Specific, Information Literacy, Professional Awareness

CRITERION FOR GRADING:

- Grading is based on the content provided, clarity of expression, and presentation of information. All papers must be typed, stapled, have no plastic covers, and be free of printer errors. Professionalism counts in grading. It is HIGHLY advisable to use a spelling and grammar tool prior to paper submission.
- No grades will be rounded up or down.
- **Each calendar day an assignment is late, a half- letter grade will be deducted** from the grade (A to A-; B- to C+)...no exceptions.
- **A student must complete ALL assignments** (except for Class Assignments which may not be made-up) to receive a passing grade in this class. A grade of Incomplete or Withdrawal will only be considered in extreme student circumstances as consistent with the Rhode Island College student handbook.
- **Make-up Exams** will be given only if permission is granted prior to the scheduled exam.

- **Students will have the opportunity to revise any component that does not meet standard, one time.** Rubric and project specifications are provided for each assignment. The final grade for the assignment will be an average of points derived from the first and second submissions.

COURSE GRADING & ARTIFACT RATINGS

A	94 and above (exemplary)	A-	90 – 93 (acceptable)	B+	87 - 89 (acceptable)
B	84 – 86 (acceptable)	B-	80 - 83 (acceptable)	C+	77 - 79
C	74 - 76	C-	70 - 73	D+	67 - 69
D	64 - 66	D-	60 - 63	F	Under 60

POLICIES:

- **Classroom Interactions:** Students are expected to come to class prepared to discuss relevant course topics, readings, and interact with all class members. Thus, it is necessary that all interactions be respectful of individual differences, perspectives, and experiences.
- **Accommodations:** Rhode Island College is committed to making reasonable efforts to assist individuals with documented disabilities. If you are seeking reasonable classroom accommodations under the Americans with Disabilities Act and/or Section 504 of the Rehabilitation Act of 1973, you are required to register with the Student Life Office. The Student Life Office is located in Rm. 127 in Craig-Lee Hall. The telephone number is 456-8061. To receive academic accommodations for this class, please obtain the proper forms from the Student Life Office and meet with the professor at the beginning of the semester.
- **Academic Honesty:** Please refer to Rhode Island College Handbook policies and procedures on Academic Honesty. Plagiarism on a paper or cheating on a test or quiz results in automatic failure of that assignment and disciplinary action. See attached
- **BCI Requirement:** FSEHD has instituted a new policy to require a BCI (background check) for all students who will come in contact with children/youth as a result of a course. This includes all undergraduate and graduate Special Education classes with a practicum, classes with an assignment that requires contact with students, graduate internships and student teaching beginning Spring 2010 semester. Students will be responsible to: obtain a BCI through the FSEHD or obtain a BCI directly through the Attorney General or Provide evidence of a previous BCI (within one year). **Please review** <http://www.ric.edu/feinsteinSchoolEducationHumanDevelopment> for more information.

REFERENCES:

American Association for the Advancement of Science. (1990). *Project 2061: science for all Americans*. New York: Oxford Press.

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- Hein & Price. (1995). *Active Assessment for active science*. Portsmouth, NH: Heinemann.
- Hyerle, D. (1996). *Visual Tools for Constructing Knowledge*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Jitendra, A. (2002). Teaching students math problem-solving through graphic representations. *Teaching Exceptional Children*, 34(4), 34-39.
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- Kuhn, T.S. (1962). *The structure of scientific revolutions*. Chicago, IL: University of Chicago Press.
- McREL. (2001) *ED thoughts: what we know teaching and learning about science*. McREL.
- Miller, S.P. & Mercer, C.D. (1997). Educational aspects of mathematics disabilities. *Journal of Learning Disabilities*, 30(1), 47-56
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- Rice, D.C. (2002). Using trade books in teaching elementary science. Facts and fallacies. *The Reading Teacher*, 55(6), 552-565.
- Rose, D., Meyer, A. (2002). *Teaching every student in the digital age*. VA: Association for Supervision and Curriculum Development.
- Saul & Reardon. (1996). *Beyond the science kit: Inquiry into action*. Portsmouth, NH: Heinmann.
- Tucker, B.J., Singleton, A.H. & Weaver, T.L. (2002). *Teaching Mathematics to All Children*. Upper Saddle River, N.J. Merrill/Prentice-Hall.
- Wise, V.L.; Spiegel, A.N. & Bruning, R.H. (1999). Using Teacher Reflective Practice to Evaluate Professional Development in Mathematics and Science. *Journal of Teacher Education*, 50.

INTERNET RESOURCES

Council for Exceptional Children: <http://www.cec.sped.org/>

East Bay Educational Collaborative. Rhode Island Science Materials and Resource Center. 317 Market Street, Warren, RI. NSF-endorsed science kit-based curricula are used in this course. Information and supportive resources can be accessed online for free at <http://www.ebecri.org>.

Exemplars. <http://www.exemplars.com>

Exploratorium. <http://www.exploratorium.edu/>

Investigations on-line handbook:

<http://www.scottforesman.com/investigations/Handbook/index.html>

Investigations home page: <http://www.terc.edu/investigations/index/html/index.html>

National Council of Teacher's of Mathematics: <http://standards.nctm.org/document/chapter3/index.htm>

National Science Education Standards: <http://www.nap.edu/readingroom/books/nse/>

National Science Foundation. (1999). *In Foundations Vol. 2. An introduction to inquiry. National Science Foundation*. (NSF 99-148). Access at <http://www.nsf.gov/pubs/2000/nsf99148/pdf/nsf99148.pdf> or at <http://www.exploratorium.edu/ifi/>

Rhode Island Department of Education: <http://www.ridoe.net>

Grade Level/Span Expectations <http://www.ridoe.net/standards/gle/default.htm>

Rhode Island Technical Assistance Project: <http://www.ritap.org/>

Universal Design for Learning: Center for Applied Special Technology <http://www.cast.org/udl/>

US Dept. of Education, Office of Special Education: <http://www.ed.gov/about/offices/list/osers/osep>

Attendance

Students should attend all class meetings and are responsible for all class work and assignments. At the beginning of each semester, instructors will distribute a syllabus, which may include attendance and/or class participation as a component of the course grade. Students who are absent must take the initiative to determine from the instructor what course work can be made up. Students who are absent on the day of an examination should make every effort to call the instructor (or department office) before the scheduled test.

Students taking practicum or student teaching courses should comply with the following procedures in the event of absences:

Practicum: notify appropriate school office and college instructor before 8:00 a.m.

Student teaching: notify coordinator of student teaching and cooperating teacher, as soon as possible.

All students who incur or anticipate an extended absence (five consecutive days or more) should call the Office of Student Life at 456-8061, so that a notice (not an excuse) may be sent to instructors.

Academic Honesty

Students who willfully violate the principles of academic honesty (e.g., through cheating on examinations or assignments, plagiarism [see below], altering or changing records, etc.) are subject to consequences ranging from an effect on their grade to academic probation or expulsion depending on the seriousness of the act. Any student accused of academic dishonesty may appeal to the Board of College Discipline.

Computer Ethics

All users of computers are required to practice ethical behavior in his/her computing activities. Our computer system is not violator proof and any unauthorized use will be considered a violation of academic honesty as well as a violation of the General Laws of Rhode Island.

Multiple Submissions

Unauthorized multiple submission of work for credit is a form of academic dishonesty. It occurs when a student, who has not been given permission to do so, submits for academic credit work that is the same or substantially the same as work that has been submitted for credit in another course. Many professors allow re-working or building on prior work, however, multiple submissions are permitted only with the prior permission of the instructor(s), and only when the student acknowledges the multiple submission in the work itself.

Plagiarism

Any attempt to present someone else's work as one's own, on quizzes, examinations, reports, or term papers, constitutes plagiarism, an act closely analogous to the theft of money or goods or to any form of swindling or fraud, and in the academic world, just as deplorable. There are various forms of plagiarism of which the following are most common:

1. **Word-for-word plagiarism.** This includes (a) the submission of another student's work as one's own; (b) the submission of work from any source whatever (book, magazine, or newspaper article, unpublished paper, or thesis) without proper acknowledgment by footnote or reference within the text of the paper; (c) the submission of any part of another's work without proper use of quotation marks.
2. **Patchwork plagiarism.** This consists of piecing together of unacknowledged phrases and sentences quoted verbatim (or nearly verbatim) from a variety of sources. The mere reshuffling of other people's words does not constitute "original" work.
3. **Unacknowledged paraphrase.** It is perfectly legitimate to set forth another author's facts or ideas in one's own words, but if one is genuinely indebted to the other author for these facts or ideas, the debt must be acknowledged by footnote or reference within the text of the paper.
4. **Many facts, ideas, and expressions are common property and need not be acknowledged,** (e.g., the fact that the Declaration of Independence was signed in 1776; the idea that universal public education is essential to the survival of democratic institutions; such proverbial expressions as "A rolling stone gathers no moss," or "New York—it's a great place to visit, but I wouldn't want to live there"), to acknowledge indebtedness. It is especially important that all students understand the nature of plagiarism; for further explanation, see Sears, Harbrace, *Guide to the Library and Research Paper*.