



**FIUteach Research Methods**  
**(3 Credits)**  
**Fall 2016**

**BSC 3910**  
**CHM 3910**  
**ISC 3523**  
**PHY 3018**

**Meeting Time:** Wednesdays 1:00-3:30 p.m.

**Location:** OE 295

**Instructors:** Prof. Thomas Pitzer

**Office:** OE 273B

**Office Hours:**

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**Prerequisites:** SMT 2661/2662 or SMT 2044

**Required Supplies:** Laptop and USB Flash Drive (1GB storage capacity, recommended)

**Required Texts:**

*Florida Standards in Mathematics and Science*

<http://www.fldoe.org/academics/standards/subject-areas/math-science/index.shtml>

*Curriculum Standards and Focal Points* from

<http://www.nctm.org/>

Additional materials on Blackboard or emailed to you by the professor. Please be sure to have regular access to any e-mails sent to your FIU account.

**Course Description**

Research Methods is a one-semester, three-hour course in the required UTeach sequence. It is one of several content courses specially designed to meet the needs of future teachers (others include Perspectives on Science and Mathematics and Functions and Modeling). It also fulfills both a science and a university substantial writing component requirement. Sections are limited to 30 students, who meet two hours per week for non-traditional, interactive lectures and two hours per week for lab. The course is cross-listed in Physics, Chemistry, and Biology.

The goals of the course are:

- to provide UTeach students with the tools that scientists use to solve scientific problems;
- to give students the opportunity to use these tools in a laboratory setting;
- to make students aware of how scientists communicate with each other through peer-reviewed scientific literature; and
- to enable students to understand how scientists develop new knowledge and insights, the most important of which are eventually presented in textbooks and taught in conventional science classes.

Students design and carry out four independent inquiries, which they write up and present in the manner that is common in the scientific community. The inquiries incorporate mathematics and the various science disciplines, thus the team of instructors teaching this course have expertise in different disciplines and are available to supervise all students as they work on their inquiries in the lab. Teaching Assistants (TAs) and Master Teachers are also members of the instructional team.

The combination of Research Methods and Perspectives on Mathematics and Science provides prospective science and mathematics teachers with an in-depth understanding of how the scientific enterprise works.

## Course Objectives and Expectations

Course Objectives and Evidence of Student Learning and Engagement	
<i>Students will:</i>	<i>Evidence:</i>
create their own experiments to answer scientific questions.	<ul style="list-style-type: none"> <li>Four papers on four separate independent inquiries, designed and carried out by the student: (1) brief home inquiry, (2) laboratory inquiry using high school equipment, (3) survey involving human subjects, and (4) extended laboratory inquiry</li> </ul>
design experiments to reduce systematic and random errors and use statistics to interpret the results.	<ul style="list-style-type: none"> <li>Papers on inquiries 2, 3, and 4</li> <li>Proposals for inquiries 2 and 4</li> </ul>
use probes and computers to gather and analyze data.	<ul style="list-style-type: none"> <li>Instructor observations during inquiry 2 or 4 or both</li> </ul>
use statistics to interpret experimental results and deal with sampling errors.	<ul style="list-style-type: none"> <li>Two homework assignments</li> <li>Two brief in-class papers</li> <li>Class performance</li> <li>Write-ups for inquiries 2, 3, and 4</li> </ul>
treat human subjects in an ethical fashion.	<ul style="list-style-type: none"> <li>Certificate demonstrating completion of human subjects training</li> <li>Satisfactory completion of inquiry 3, which involves human subjects</li> </ul>
apply safe laboratory procedures.	<ul style="list-style-type: none"> <li>Instructor observations during inquiries 2 and 4</li> </ul>
find and read articles in the scientific literature.	<ul style="list-style-type: none"> <li>Two homework assignments</li> <li>Performance assessment during debate</li> </ul>
create mathematical models of scientific phenomena.	<ul style="list-style-type: none"> <li>Two homework assignments</li> <li>Personalized modeling assignments as part of inquiries 2 and 4</li> </ul>

Course Objectives and Evidence of Student Learning and Engagement	
<i>Students will:</i>	<i>Evidence:</i>
apply scientific arguments in matters of social importance.	<ul style="list-style-type: none"> <li>• Student presentations of open questions</li> </ul>
write scientific papers.	<ul style="list-style-type: none"> <li>• Four written inquiries, with inquiries 2 and 4 involving at least two drafts</li> </ul>
review scientific papers.	<ul style="list-style-type: none"> <li>• Student evaluations of each other, in pairs</li> </ul>
give oral presentation of scientific work.	<ul style="list-style-type: none"> <li>• In-class oral reports on inquiries 2 and 4</li> </ul>

### Course Requirements and Expectations

You must purchase the book *Surely You are Joking, Mr. Feynman*. Other materials will be provided. Some course topics will be covered only in class, and you must be present to receive credit. If you turn assignments late without approval, you will lose 10% of the value of the assignment for each day it is late. Write-ups of your final inquiries will be graded according to a rubric you will find in your course packet and checklists you can find on the course Web site.

Inquiry drafts will be graded by checking whether the major sections of the report have been completed (Abstract, Introduction, Design, Analysis, Conclusions).

Rewrite policy: Final drafts of Inquiries 1, 2, and 3 that have been turned in on time can be rewritten for additional credit. Contact your lecture instructor for details of the policy.

Please note that the final inquiry must be related to the subject for which you have signed up for the class. For example, if you are registered in biology, your final inquiry must be a biology inquiry.

Research Methods is a "substantial writing component course." Therefore, your inquiries will be evaluated both on content and the quality of written expression. There will be no formal examinations.

### Assignments and Grading Policy

Activities	Points
Class and Laboratory Attendance. as determined by checks of active participation and submission of in-class assignments.	10
Homework Assignments.	25
Inquiry 1	5
Inquiry 2 Proposal	2
Inquiry 2 Draft. The draft may not be accepted if the proposal was not turned in on time.	3
Inquiry 2 Oral Presentation	3
Inquiry 2 Final Write-up. The formal write-up may not be accepted if the first draft was not turned in on time, the presentation was delivered, and the student participated in partner grading.	10
Inquiry 3 Write-up.	10
Inquiry 4 Proposal.	2
Debate Presentation.	5
Inquiry 4 Draft. The draft may not be accepted if the proposal was not turned in on time.	5

Inquiry 4 Oral Presentation.	5
Inquiry 4 Final Write-up. The formal write-up may not be accepted if the first draft was not turned in on time, the presentation was delivered, and the student participated in partner grading.	15
TOTAL	100

Late Work Policy: Some course topics will be covered only in class, and you must be present to receive credit (no makeups). If you turn assignments late without approval, you will lose 10% of the value of the assignment for each day it is late.

Dropping the Course: A student may not drop a course after the fourth class day except for good cause (e.g., health or serious personal problems, or a demonstrated need to work more hours). A student seeking to drop a class after the fourth class day should go to the Office of the Dean/Student Division for necessary approvals.

**1. Grading: \*\* Points will be deducted for late and/or incomplete work. \*\***

(10% minimum deduction; up to half off for lesson plans submitted late)

**2. Grading Scale**

93	--	100	A
90	--	92	A-
87	--	89	B+
83	--	86	B
80	--	82	B-
76	--	79	C+
70	--	75	C
60	--	69	D
59	--	0	F

**\*\*Grading: \*\* Points will be deducted for late and/or incomplete work. \*\***

(10%/day minimum deduction; up to half off for lesson plans submitted late/incomplete) Late/incomplete lesson plans may result in delayed/cancelled field experiences that may impact your grade negatively.

**Course expectations**

**Attendance, participation, and professionalism:** Twenty-five percent of your grade is based on attendance, active participation, and professionalism in all class sessions and field experiences. Students will begin the semester with 15 points.

- Attendance:** Students will lose points for every unexcused absence in class and in field experiences. You must provide documentation for an excused absence. Please contact your instructor before missing class. Three or more unexcused absences (2 tardies equal one absence) will **result in failure of the course regardless of accumulated points.** Credit for attendance requires arriving to each class session on time, participating in all class activities, and staying until the session ends. If you arrive late or leave early, you will lose points off your attendance grade.
- This course is designed to involve the students in an activity-oriented setting. Your active participation and attendance in classroom is of crucial importance to accomplish the goals of the course. You are expected to participate in classroom activities, and to complete all assignments satisfactorily.

**University Policies**

Academic Misconduct – Academic misconduct by students includes all acts of dishonesty in any academically related matter and any knowing or intentional help or attempt to help, or conspiracy to help, another student commit an act of academic dishonesty. The Academic Misconduct Disciplinary Policy will be followed in the event of academic misconduct.

Accommodations: If you are registered with the Office of Disability Services, please make an appointment with the instructor as soon as possible to discuss any course accommodations that may be necessary. If you have a disability but have not contacted the Office of Disability Services, please call 348-3532 or go to GC190 to register for services.

Plagiarism - Plagiarism is the act of representing words, data, works, ideas, computer program or output, or anything not generated by the student as his or her own. Plagiarism may be inadvertent or purposeful; however, plagiarism is not a question of intent. Plagiarism is considered a serious act of academic misconduct and may result in a student receiving an “F” in the course and being suspended from the University. Please note that your paper may be examined by turnitin.com to detect possible cases of plagiarism. For more information, see <http://coeweb.fiu.edu/plagiarism/>

- 1. Florida International University is a community dedicated to generating and imparting knowledge through excellent teaching and research, the rigorous and respectful exchange of ideas, and community service. All students should respect the right of others to have an equitable opportunity to learn and to honestly demonstrate the quality of their learning. Therefore, all students are expected to adhere to a standard of academic conduct, which demonstrates respect for themselves, their fellow students, and the educational mission of the University. All students are deemed by the University to understand that if they are found responsible for academic misconduct, they will be subject to the Academic Misconduct procedures and sanctions, as outlined in the Student Handbook.***