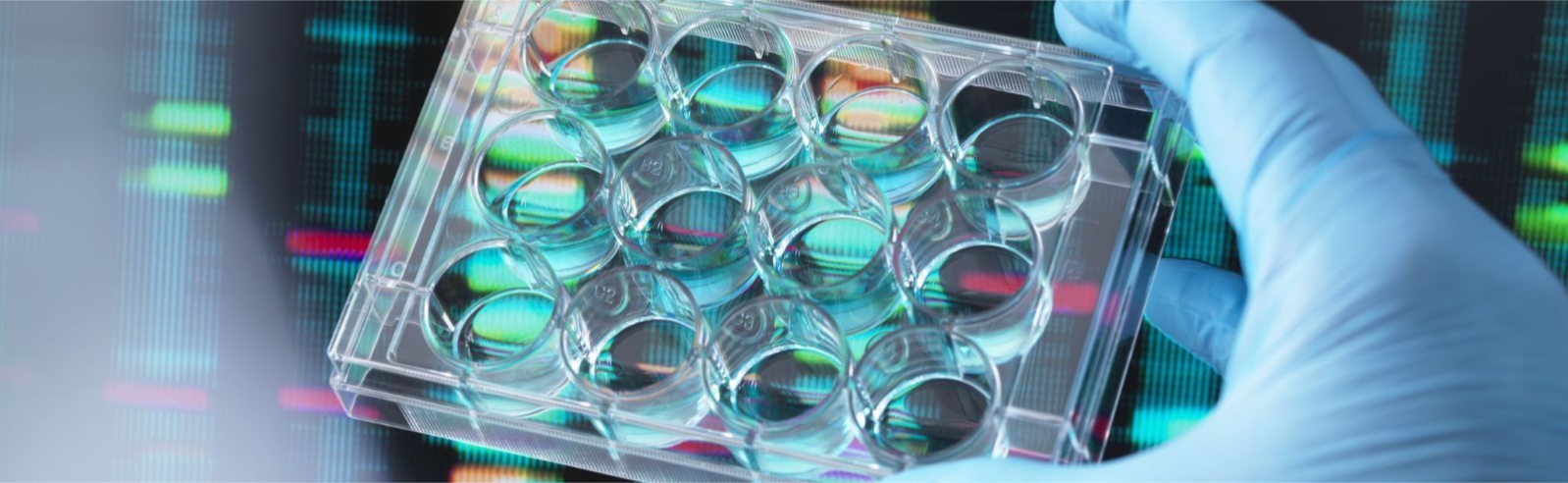
**RES 110 Intermediate STEM Research**

4-5 credits (1 additional credit for summer work)

Instructor Contact Information Here



Permission of instructor required.

Prerequisite: Satisfactory completion of RES 100

Available for year-long course of study through the Dual Enrollment Program only.

**Course Catalog Description:**

This is the second course in a three-course scientific research sequence. Students have gained experience accessing scientific databases, conducting effective online bibliographic searches, and determining the appropriateness of sources in the prerequisite RES 100. This course is about refining a research topic that is new and unexplained. The emphasis is on conceptualizing the research design, gathering information, identifying the variables involved, determining the appropriate method to collect data, and selecting the most appropriate analytical strategies to answer the research question. The course will also focus on respecting intellectual property, time management, organization, and communication skills, as well as prioritizing and goal setting. Once students have developed an overall research strategy for the design and implementation of their research, they must submit their plan to a Scientific Review Board (SRB) for approval. Students will maintain a scientific notebook and a comprehensive portfolio of all research work. Once students have completed their investigation, they will focus on developing their research proposal into a research paper complete with results, discussion, conclusion, and next steps. Students will present their research at a scientific symposium.

**Course Objectives/Learning Outcomes**: By the end of this course, students should be able to:

* Refine a research question to an appropriate level of specificity considering existing constraints
* Propose hypotheses and demonstrate **Creativity** by designing their own scientific experiment to answer a question or solve a problem in a new and unusual way.
* Determine how to collect appropriate data to answer the research question
* Demonstrate **Critical Thinking and Quantitative Literacy** to determine the appropriate analysis procedure.
* Demonstrate **Ethical Reasoning** by identifying how their research question could affect other individuals, the environment, and the world.
* Write or refine a scientific research proposal and obtain SRB approval
* **Communicate** research proposal visually by creating a scientific poster and by presenting the poster at a public symposium

\*Students will engage in undergraduate level research throughout the course, which is a high-impact practice.

**Alignment of assignments with learning outcomes**

|  |  |
| --- | --- |
| Learning Outcome | Assignments |
| Refine a research question to an appropriate level of specificity considering existing constraints | ***Scientific Notebook***  ***Research Proposal*** |
| Propose hypotheses and demonstrate **Creativity** by designing their own scientific experiment to answer a question or solve a problem in a new and unusual way. | ***Scientific Notebook***  ***Research Proposal*** |
| Determine how to collect appropriate data to answer the research question | ***Scientific Notebook***  ***Research Proposal*** |
| Demonstrate **Critical Thinking and Quantitative Literacy** to determine the appropriate analysis procedure. | ***Scientific Notebook***  ***Research Proposal*** |
| Demonstrate **Ethical Reasoning** by identifying how their research question could affect other individuals, the environment, and the world. | ***Scientific Notebook***  ***Journal Article Reviews***  ***Research Proposal*** |
| Write or refine a scientific research proposal and obtain SRB approval | ***Journal Article Reviews***  ***Research Proposal*** |
| **Communicate** research proposal visually by creating a scientific poster and by presenting the poster at a public symposium | ***Symposium Presentation*** |

**Required Text and References**

* Dawson, C., 2019. Introduction to Research Methods. 5th edition
* Kumar, R. 2014. Research Methodology: a step-by-step guide for beginners. 4th edition. Sage.
* Publication Manual of the American Psychological Association, Seventh Edition (2020)

**Methods for Assessment of Learning**

* ***Scientific Notebook:*** Time logs chronicling approximately 8 hours of research every week. Annotations of research must be in a scientific notebook.
* ***Journal Article Reviews:*** Students will read at least three journal articles related to their topic. They will create a power point of key ideas in each of the research articles with examination of bias and evaluation of impact for their research. Students present each of the research articles to the class. Class discusses and critiques presentation.
* ***Research Proposal*:** A primary activity for this course is the completion of an APA style research proposal for an independent research project. The proposal includes all major sections of an APA-style paper (Title page, Abstract, Introduction, Literature Review, Methods, Proposed Analyses, Discussion, and References), copies of all proposed instruments and copies of all cited reference articles. This submission must include: (1) an electronic copy of your proposal, 2) all appendices (including drafts of informed consent form, debriefing form, etc.), and 3) copies of all articles cited in your proposal.
* ***Symposium Presentation:*** Students will create a poster outlining their research and present it at a symposium.
* ***Biweekly assessments:*** Students will conference with instructor every two weeks to discuss goals and review research progress.
* ***Exams:*** 
  + Mid-term evaluation: Introduction, Research Question, Hypothesis, Identification of variables, and proposed analytic methods
  + Final evaluation will be the submission of your proposal to the Scientific Review Board (SRB), creation of research proposal poster, and presentation at a science symposium.

***Attendance***: Attendance will be taken and is part of the Class Participation grade. Students need to document at least 3 hours of work each week for class time.

***Class Participation*:** Students can earn up to 50 points for participation.

* *40****-5****0 points*: Attend almost every class. Ask and answer questions, submit all assignments on time, demonstrate knowledge of materials, participate actively in exercises, and attend office meetings with regularity.
* *25-39 points*: Attend about two thirds of in-class and online meetings, ask and answer some questions, demonstrate some knowledge of materials, participate in exercises, and miss only two or three office meetings.
* *0-24 points*: Attend class intermittently, did not participate by asking and answering questions including chat, and/or did not participate in demonstrating knowledge of materials, did not participate actively in exercises, and miss more than three office meetings.

Therefore, there are a possible 1000 *points* for the course:

|  |  |  |  |
| --- | --- | --- | --- |
| **Assignment** |  |  | **Total Points** |
| Proposal |  |  | 50 |
| Homework |  |  | 400 |
| Biweekly assessments |  |  | 200 |
| midterm |  |  | 150 |
| Final paper and poster |  |  | 150 |
| Class Participation |  |  | 50 |

Grades for this course will be determined as follows:

* A = 93-100%
* A- = 90-92%
* B+ = 87-89%
* B = 83-86%
* B- = 80-82%
* C+ = 77-79%
* C = 73-76%
* C- = 70-72%
* D+ = 67-69%
* D = 60-66%
* F = Below 60

**Course outline for SCI 110 (The Research Design)**

This course is divided into 6 topic areas:

Part 1: Qualitative and quantitative research methods

Part 2: How to conduct experiments

Part 3: Sampling methods

Part 4: How to analyze your data

Part 5: Ethics in science research

Part 6: Preparing for a Science Review Board (SRB) – Writing a research proposal

|  |  |
| --- | --- |
| Week # | Topics |
| 1 | Plagiarism and bias review |
| 2 | The research design  Correlation vs causation |
| 3 | Variables and controls |
| 4 | Introduction to Qualitative research  Limitations and advantages  Types and examples  Methods |
| 5 | Interpretating Qualitative Data  Types – content, narrative, discourse, thematic  Challenges  Benefits |
| 6 | Introduction to quantitative research  Limitations and advantages  Types and examples  methods |
| 7 | Collection and Analysis techniques  Statistics – descriptive and inferential |
| 8-10 | Reading scientific articles to get ideas for your experimental design |
| 11-15 | Experimental design  Ethics and your experiment  Informed consent  Confidentiality  Harm to participants – animal or human |
| 15 -20 | Testing your experimental design |
| 21-22 | Midterm project work |
| 23-24 | Construction of observation data tables |
| 25-26 | Construction of analysis data tables |
| 26 -30 | Writing a research proposal for Scientific Review Board (SRB) |
| 31 | Test trial of experiment |
| 32-34 | Analysis of test trial |
| 35- 41 | Create a scientific poster detailing Review of literature, purpose of study, proposed method of experimentation, data collection and analysis, and what results are expected.  Help organize school scientific symposium |
| 42 | Defend poster at scientific symposium |
| 43- ? | Run the experiment for the appropriate number of trials to get an accepted data size supervised by your mentor. |

**ASSESSMENT RUBRIC FOR RES 110**

**Science Research Biweekly Assessment**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Scoring Key:

A = outstanding work B = adequate work C = less than adequate D = dismal F = not there

NA = not applicable to this assessment

During this evaluation, did the student:

1. Document an appropriate amount of research for articles/information/people supported by documentation?

A B C D F NA

1. Achieve appropriate advancement in reading journals that are clearly annotated and summarized?

A B C D F NA

1. Effectively use their time both in class and out of class as evidenced by their time log?

A B C D F NA

1. Demonstrate respect for others in the classroom, displaying an exemplary and helpful attitude towards the research classroom?

A B C D F NA

1. Meet all deadlines and goals set at the end of the last assessment?

A B C D F NA

1. Statistically give a PowerPoint or poster presentation or complete a required paper?

A B C D F NA

1. Demonstrate independence, self-motivation, enthusiasm and timeliness to forward their progress in their research efforts?

A B C D F NA

1. Communicate with teacher, mentor or other appropriate professional promptly with documentation?

A B C D F NA

**Missing an assessment is an automatic zero unless there is an unforeseen legal absence. It is the students responsible for rescheduling the assessment ASAP. If a student needs to reschedule an assessment due to unforeseen circumstances, notification must be at least 24 hours in advance. It is up to the evaluator to decide how or when to reschedule based on the circumstances. Failure to reschedule the assessment ASAP could result in a missed assessment.**

Overall grade for this assessment: \_\_\_\_\_\_\_\_\_\_

Date: \_\_\_\_\_\_\_\_\_\_\_

Student’s signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Teacher’s signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Rubric for completing SCIENTIFIC REVIEW BOARD

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | PASS | | FAIL | |
| Research question or problem | A well stated research problem/question | Research problem/question is clearly presented | Research problem/question is not clearly stated | Questionable research problem |
| Review of literature | Thorough background search is evident | Well researched background is evident | Lacking in background evidence | Inadequate background search |
| Hypothesis | A well-stated hypothesis | Research hypothesis is clearly stated | Research question and not a hypothesis | No hypothesis |
| Research design | Research design is clearly and accurately described, justified and appropriate | Research design is well described but lacks some detailed description, appropriate to meet program need | Overall design is fine but needs more refinement of description of work, partially meets program needs | Design is not described completely or inappropriate |
| Data collection | Method of data collection is well thought out, appropriate, justifiable and represents a good number of trials or sample size | Method of data collection is somewhat well thought out, appropriate, partially justifiable and represents the number of trials or sample size | Method of data collection is defined but confusing, somewhat appropriate or justifiable and represents an idea for number of trials or sample size | Not accurately defined or described, and choice of design is not justified.  Little thought into sample size or trial numbers |
| Data Analysis | Accurately defined and described | Described but lacks some details, aligns with research design | Described but lacks many details, includes errors in descriptions | Data analysis does not align with research design |
| Ethics | Attention to ethics at all levels fully described and all paperwork completed | Attention to ethics at all levels fully described and some paperwork completed. Needs additional forms | Some attention to ethics described, but needs to complete paperwork | Very little attention to ethics is describe, or missing |
|  |  | |  | |

**Accommodations for Students with Disabilities**

Eastern Connecticut State University is committed to following the requirements of the Americans with Disabilities Act (ADA) of 1990, the ADA Amendment Act of 2008, and Section 504 of the Rehabilitation Act of 1973, as amended in 1998. If you are a student with a disability (or think you might have a disability) and require accommodations or assistance evacuating a building in the case of an emergency, please contact the Office of AccessAbility Services (OAS) at 860-465-0189 to discuss your request further. Please note that accommodations are not retroactive and must be communicated through a Letter of Accommodation, which is drafted by the OAS. Please visit the Office of Accessibility Website at <https://www.easternct.edu/accessability/index.html> for more information on how to register with our office.

**Student Sexual Misconduct Policy**

Title IX of the Education Amendment of 1972, as well as the Board of Regents Policy on Sexual Misconduct Reporting, Support Services and Processes, prohibit acts of sexual misconduct – sexual harassment, sexual assault, sex-based discrimination, dating violence, domestic violence, stalking, and inappropriate relationships between employees and students.  If you or someone you know has been or experiences harassment or assault, resources are available within the Title IX Office and with the Sexual Assault & Interpersonal Violence Response Team (SAIV-RT).  Alleged violations should be reported to the Title IX Coordinator in the Office of Equity and Diversity at 860-465-5012.  Reports to law enforcement can be made to Eastern Connecticut State University Police Department at 860-465-5310.  To receive support and advocacy, please contact the Co-Chair of the Sexual Assault & Interpersonal Violence Response Team (SAIV-RT) at 860-465-4314. You may also visit the SAIV-RT website at [https://www.easternct.edu/sexual-assault-and-interpersonal-violence/index.html](https://nam04.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.easternct.edu%2Fsexual-assault-and-interpersonal-violence%2Findex.html&data=04%7C01%7Crodriguezlau%40easternct.edu%7C63e1e16837cb455b3df908d962847131%7C00bc4ae8576c45e3949d4f129d8b670a%7C1%7C0%7C637649143783810922%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C1000&sdata=wrC0aDoD0PR59afvL5VL6UHOJZRq1pCpTgZT5xVstHA%3D&reserved=0) for more information including a list of confidential resources.

**Cheating, Plagiarism, and Personal Misconduct**

Students are responsible for familiarizing themselves with the University’s numerous policies and procedures contained in the University Catalog and Student Handbook.  The Code of Conduct policies and the Policy on Academic Misconduct are of special significance, since cheating, plagiarism, and personal misconduct are strictly prohibited and carry severe penalties.  Students should read and understand Eastern's Academic Misconduct Policy, which can be found in the student handbook. <https://easternct.makekb.com/entry/307/> All violations will be handled under the procedures established in this policy.

**Assistance at the Writing Center**

The Eastern Writing Center, located in the ASC and staffed by trained peer tutors, is available to help all students with their writing. The Writing Center supports the liberal-arts mission of Eastern by helping students with their writing from any class, at any stage, from brainstorming and drafting to revision to proofreading and editing. We help students do their own work, and do it more comfortably and confidently. Any student can and should use the Writing Center. The process of talking with readers about writing and getting feedback on student writing is something all writers do and can benefit from. Students can either drop into the Center or make an appointment by going to the “Useful Links” column on the Current Students webpage and selecting “GradesFirst” ([http://www.easternct.edu/index/current-students/](https://na01.safelinks.protection.outlook.com/?url=http%3A%2F%2Fwww.easternct.edu%2Findex%2Fcurrent-students%2F&data=02%7C01%7C%7C3160dad10a984ba6642708d60f463376%7C00bc4ae8576c45e3949d4f129d8b670a%7C0%7C0%7C636713191515391454&sdata=FnXdgewhsTrm6Jmyi0RI2br6DeTwTJJZm10LwM5n9gM%3D&reserved=0)). Students are asked to bring copies of any assignment sheets to the Writing Center, so tutors know what is expected of the assignment.

**Assistance with Academic Advising and Subject Tutoring at the Academic Service Center**

Students are encouraged to use the support offered by the Academic Services Center (ASC) located on the ground floor of the Library. Advising Services and tutoring in math, writing, and other subjects, including supplementary instruction, are available. The ASC also offers Peer Academic Coaching (PAC) assistance with study techniques, time management, “Eastern in 4” planning and understanding learning styles. For further information about our services, please call 465-4625 or check the ASC website at <http://www.easternct.edu/asc/>.

**Student Crisis Statement**

Any student who is facing challenges (i.e. mental health, securing food/housing) and believes this may affect their performance in the course is urged to contact the Dean of Students at 860-465-5244 for support. Students experiencing an immediate threat to their safety or wellbeing should contact 24-hour emergency services by dialing 911 or the Eastern’s University Police Department: 860-465-5310.

**Final Examination Statement**  
University policy states that, “No examination shall be given during the final week of scheduled classes of a full semester course.” Faculty must receive prior approval from the Vice-President of Academic Affairs in order to schedule an examination during the final week of classes. Faculty may, with approval from the Vice-President of Academic Affairs in consultation with the Academic Dean and Registrar, hold a single exam session for all sections of the same course. Students will be notified of the exam date, time, and place on the course syllabus.

**Misuse of Intellectual Property**

Students are advised that lectures, notes, and faculty-developed materials are the intellectual property of the instructor. Students who record lectures without express permission\*, re-distribute notes/recordings, or in any other way violate intellectual property laws may be subject to disciplinary action (e.g. failure of the course, and/or academic misconduct charges up to and including Academic Dismissal). Faculty members reserve the right to pursue separate civil litigation pertaining to copyright violation in such situations.

\* Students with documented ADA accommodations are governed under the signed Audio Recording Agreements.

**Note on the Syllabus**

Faculty reserve the right to make changes to the course syllabus as needed. However, every attempt will be made to keep such changes to a minimum and are usually made in response to university, program, or Connecticut State Department of Education rules or regulations.

**Electronic Communication**

Students are expected to receive, read, and respond to their email in a timely fashion. Some communications may be time-sensitive or contain important classroom announcements, and students are responsible for checking their email so they can react to such information. Additionally, all electronic communications relevant to the course should take place within the ECSU email system. Do not assume that email sent by outside providers will be received by your professor.

**Weather Cancellations:**

Call (860) 465-4444 or (800) 578-1449, or go online and subscribe to the alert system: [www.easternct.edu/easternalert](http://www.easternct.edu/easternalert)

Students are responsible for familiarizing themselves with the University’s numerous policies and procedures contained in the University Catalog and Student Handbook. The Code of Conduct policies and the Policy on Academic Misconduct are of special significance, since cheating, plagiarism, and personal misconduct are strictly prohibited and carry severe penalties. Students should read and understand Eastern's Academic Misconduct Policy, which can be found in the student handbook. <http://ecsu-svkb2.easternct.edu/index.php?View=entry&EntryID=307>

All violations will be handled under the procedures established in this policy.

**Academic Success Center:** Students are encouraged to use the support offered by the Academic Success Center (ASC) located on the ground floor of the Library. Its *Writing Center* is excellent in supporting your class writing assignments. For the most updated hours of operation, check the ASC website at [http://www.easternct.edu/asc/***.***](http://www.easternct.edu/asc/)

**Academic Misconduct**: Students are responsible for familiarizing themselves with the University’s numerous policies and procedures contained in the University Catalog and Student Handbook. The Code of Conduct policies and the Policy on Academic Misconduct are of special significance, since cheating, plagiarism, and personal misconduct are strictly prohibited and carry severe penalties. Students should read and understand Eastern's Academic Misconduct Policy, which can be found in the student handbook. https://easternct.makekb.com/entry/307/