

**Forsyth Central High School
STEM Academy
Senior Capstone Project**



Introduction

In an effort to provide all students with an education that leads them to being college and career-ready, students will participate in a career-related internship and/or develop a career-related capstone project. With this in mind, all STEM students are required to complete a capstone project by the second week of April their senior year. Students may **COMPLETE** their capstone after completing 5 semesters in the STEM program. These projects are a way to allow students to uniquely show their talents related to their pathway of interest. Reflecting on who they are while showing what they want to do, the project provides students with the opportunity to explore a career of personal or professional interest and to address the latest trends or issues through focused study and applied research. The project allows students to demonstrate their ability to synthesize and apply the knowledge and skills acquired in their academic program to real-world issues and problems. These final projects should affirm students' ability to think critically and creatively, to solve practical problems, to make reasoned and ethical decisions, and to communicate effectively. STEM students, in either the Biotechnology or Engineering pathway, should endeavor to actively integrate and apply all they have learned as part of the FCHS STEM Academy in the development, implementation, and analysis of a practical, hands-on project that addresses a problem or issue encountered by the student during their program of study. Students should seek a project that requires a creative solution and that they have a personal interest in solving the problem.

The Senior Capstone Project at FCHS Stem Academy is a demonstration of knowledge in the student's chosen field of interest which results in a product/ project, research data, research paper, portfolio of work, and a presentation. This experience encourages students to use a variety of skills in the areas of writing, speaking, research, and documentation. It should be noted that students are not bound by their pathway and may choose a project that is cross curricular in nature.

- 1. All projects must be approved by the Capstone Committee no later than the first week in October.**

Goals of Capstone Project as Outlined by the Georgia Department of Education

- To provide students with the opportunity to apply the knowledge and skills acquired in their courses to research relating to a career interest area
- To allow students to extend their academic experience into areas of personal career interests, to include working with new ideas, organizations, and individuals
- To encourage students to think critically and creatively about academic, professional, and/or social issues and to further develop their analytical and ethical leadership skills
- To provide students with the opportunity to refine research skills and demonstrate their proficiency in written and/or oral communication skills

Main Requirements:

1. Mentor/Teacher Advisor
2. Independent Internship/Research Paper
3. Product-i.e. actual device, prototype or research data/Evidence from Internship
4. Presentation

Mentor/Teacher Advisor

Students are required to have a mentor for their SCP. The mentor must be an expert in the field and may be the same person as their teacher advisor (a teacher in the STEM Academy). It is the student's responsibility to acquire a mentor and get their approval by first week of September their senior year. Mentors are required to submit information regarding the contact information and experience of the of the student and, if participating in an off-campus internship, the location of the work site prior to beginning the experience.

1. Mentors must complete the following Mentor Agreement form using the following link:
 - <https://goo.gl/forms/gp2BDSja8u863Oy13>
2. Mentors are to complete, at the end of each month, the number of hours per week the student dedicated to the Capstone Project. Please use the following link:
 - <https://goo.gl/forms/rxSsEkXcu7yobVng2>

Research/Independent Internship Paper Requirements

- 1 inch margins throughout and pages numbered
- 12 point Times New Roman font size
- Double-spaced throughout the text and works cited page(s).
- Minimum of five (5) sources,
- Students should use a rich variety of words appropriate for context and should submit a paper that is free from grammatical errors and use excellent sentence structure.
 - Evidence of student's active review and revision of the document
- In-text and/or parenthetical documentation
- Title page and a works cited page according to APA format.
- Length 1200-1500 words, not including the title page, and works cited page.
- Paper must be turned in as part of a SCP presentation or to the Capstone Committee by the end of March their senior year.
- "Plagiarism: the practice of taking someone else's work or ideas and passing them off as one's own." Plagiarism is considered cheating, and will result in receiving a zero on the paper/capstone project.
- The paper should be written in the student's own words except for properly documented quotes from sources.
- Sample Papers are posted in the STEM folder on ITSL, Student Information Folder

Research/Independent Internship Paper Guidelines:

There are four main sections to the capstone research paper.

These are the initial pages, main body, references, and appendices (only if necessary).

Initial Pages:

- I. Numbering: Use smaller case Roman numerals except on the title page. The title page is counted but not numbered. Numbers should be located in the upper right hand corner.
- II. Required initial pages (in sequential order):
 - **Title Page:** See sample page for an example and instructions
 - **Abstract Page:** See sample page for an example and instructions
 - **Table of Contents:** List all chapters, section titles, and subdivision titles. The entry in the table of contents should exactly match the heading in the body of the paper and the page number(s). See sample page for an example and instructions.
 - **List of figures:** Follow the same format used for table of contents. Additionally, include the figure number and caption. Figures should be numbered consecutively in the paper. Do not forget to include any figures located in the appendix.
 - **List of Tables:** Follow the same format used for list of figures

Main Body:

- I. Numbering: Use Arabic numerals locating them in the upper right hand corner of the page. The title page is page one.
- II. Reference the APA style manual for instructions on the method for identifying sections and subsections. Any section or subsection heading coming at the bottom of the page should have at least two lines of text below it.
- III. Tables and figures: Maintain the same margin requirements as the rest of the paper. All tables and figures should be identified by number. Refer to all figures and tables by number.

References/Bibliography: Follow the APA style manual.

American Psychological Association. (2009). *Publication Manual of the American Psychological Association* (6th ed.). Washington, D.C.

ISBN 13: 978-1-4338-0562-2. ISBN 10: 1-4338-0562-6.

Appendices: Use only when appropriate. Material in an appendix supports the research but is not necessary to understand it. Appendices are labeled by capital letter.

**** See the end of the document for sample title page, sample abstract page, sample table of contents and rubric.

Presentation

– Students will:

- Formally present their SCP to the Capstone Committee, FCHS Faculty and business partners
- As part of the presentation, the research paper should be summarized.
- Demonstrate how they applied this to an actual deliverable (project/portfolio/product).
- Present visual evidence on a presentation board or as part of a Power Point presentation.
- Demonstrate mastery of their topic as they respond to a question and answer period.

**** Note: competition and presentation of a project at a regional (or higher level) Science and Engineering Fair satisfies the presentation component of the SCP. The research paper is a separate section.

**Capstone Presentation Assessment Scoring Guide/Rubric
Spring 2019**

Presenter: _____ **Date:** _____

Topic of Presentation: _____

Directions: 1) Mark assessed level. 2) Sum the total for each section (I, II..) in the Score column 3) Add all scores to get Total Score .					
1a) Listen and speak effectively in conversational, small group, public and intercultural contexts		Fails to Meet Criterion	Meets Criterion	Exceeds Criterion	Score
I. Speaking					
A. Speaks clearly and distinctly throughout		1	2	3	
B. Uses appropriate language for the discipline		1	2	3	
C. Vocalized pauses (um, uh, er, etc.) are not distracting		1	2	3	
D. Speaks with confidence; neither too quickly, nor too slowly		1	2	3	
II. Organization/Preparation					
A. Introduction effectively communicated presentation goals		1	2	3	
B. Topic was well focused & appropriate		1	2	3	
C. Clear evidence of planning, obviously rehearsed		1	2	3	
D. Conclusion summarized ideas well		1	2	3	
III. Delivery					
A. Maintains eye contact and has appropriate body language during presentation		1	2	3	
B. Professional Dress		1	2	3	
C. Delivery medium was appropriate		1	2	3	
D. Listens effectively to adequately address questions		1	2	3	
Content					
III. Apply knowledge and skills to new settings and complex problems					
A. Student presents information in a manner that represents understanding and knowledge of content and career options.		1	2	3	
B. Discussed possible applications to future career		1	2	3	
Total Score (42 possible)					

Sample Title Page for Research Paper

Titles are centered and must be in Caps- Date is the date you turn in the paper.

ELECTROMAGNETIC CHARACTERISTICS SPIRO-HELICAL ANTENNAE

by

John Q. Public

A Research Paper Submitted in Partial Fulfillment of the STEM Academy Capstone Requirement at
Forsyth Central High School
April 2016

Sample Abstract Page for Research Paper

Note: single space for title and institution name, double-spacing for everything else except actual abstract which is six spaces below mentor/instructor's name. Include a page number

ABSTRACT

ELECTROMAGNETIC CHARACTERISTICS SPIRO-HELICAL ANTENNAE

by

John Q. Public

Forsyth Central STEM Academy
Under the Supervision of [name of instructor/mentor]

Abstract goes here: Limit 150-250 words double spaced (counts as part of total word count)

Websites that may be helpful with your abstract:

<http://www.easterbrook.ca/steve/2010/01/how-to-write-a-scientific-abstract-in-six-easy-steps/>

<http://www.csus.edu/org/swaa/guide/index.html>

<https://www.winthrop.edu/uploadedFiles/cas/english/AbstractTips.pdf>

Sample Research Paper Table of Contents Page

Instructions for the Title Page: TABLE OF CONTENTS should be in all capital letters and centered at the top of the page. Begin entries three spaces below title. Double space all entries and single space within entries. Figures and tables are not included in the TABLE OF CONTENTS.

TABLE OF CONTENTS

ABSTRACT	2
TABLE OF CONTENTS	3
RESEARCH QUESTION	x
Introduction	x
Problem Statement	x
Theoretical Foundation	x
LITERATURE REVIEW	x
ANALYSIS	x
Methodology	x
Results	x
CONCLUSIONS	x
Implications	x
Recommendations	x
REFERENCES	x
APPENDICES	x

Note on page numbers: The title page is page number 1, abstract is page number 2, and Table of Contents is page number 3. The “x” in the above example represents the subsequent consecutive page numbers.

Research Paper Rubric

Student

Name _____

Date _____

Teaching Task Rubric (Informational or Explanatory)

Scoring Elements	Exemplary (4)	Proficient (3)	Needs Development (2)	Ineffective (1)	Points
Focus	Addresses all aspects of Topic appropriately and maintains a strongly developed focus.	Addresses topic appropriately and maintain a clear, steady focus.	Addresses topic appropriately, but with a weak or uneven focus.	Attempts to address topic, but lacks focus or is off-task	
Controlling Ideas	Establishes a strong controlling idea with a clear purpose maintained throughout the response.	Establishes a controlling idea with a general purpose.	Establishes a controlling idea with a clear purpose maintained throughout the response.	Attempts to establish a controlling idea, but lacks a clear purpose.	
Reading/Research	Accurately presents information relevant to all parts of the prompt with effective selection of sources and details from reading materials.	Presents information from reading materials relevant to the purpose of the prompt with minor lapses in accuracy or completeness.	Presents information from reading materials relevant to the prompt with accuracy and sufficient detail.	Attempts to present information in response to the prompt, but lacks connections or relevance to the purpose of the prompt.	
Development	Presents thorough and detailed information to strongly support the focus and controlling idea. Thoroughly discusses relevant and salient implications or consequences and one or more significant gaps/unanswered questions.	Presents appropriate details to support the focus and controlling idea. Briefly notes a relevant implication or a relevant gap/unanswered question.	Presents appropriate and sufficient details to support the focus and controlling idea. Explains relevant and plausible implications and a relevant gap/unanswered question.	Attempts to provide details in response to the prompt, including retelling, but lacks sufficient development or relevancy. Implication is missing, irrelevant or illogical.	

Capstone Project Checklist

Student Name _____

Advisor Name _____

	Advisor Signature	Date of Submission
1. Project Proposal		
2. Research Paper/ Proposal		
3. Mentor Agreement		
4. Presentation		

Date of Project Completion _____

Student Signature _____

Teacher/Advisor Signature _____