CLAIM:
The Biology staff at X believes the pacing for Biology should be taught from micro to macro.

EVIDENCE:
1) As per District assessments (Previous years) students have scored “better” when all of the basic of Biology have been covered early on in the year.
2) As per ATM school end of year data, when the pacing was changed to Macro to Micro, the students performed worse on the Biology EOC.
3) As per Teacher observations, and student feedback, Biology makes more sense when taught from micro to macro because students have the basics (from middle school) and teachers can build on this knowledge as well as introduce new concepts with ease.

REASONING:
According to the evidence, the pacing that should be adopted is from Micro to Macro. Biology is a difficult subject matter. It is content rich and vocabulary driven. Students should be exposed to this early on in the year, and a solid foundation needs to be built in order for them to learn the more difficult concepts.

Students that begin with the Macro – to- Micro approach in Biology have a more difficult time tying content together because the teachers struggle to teach around concepts that they have not yet covered. For example, when teaching evolution, it is extremely difficult to cover topics such as molecular evidence, when DNA has not yet been covered. It is difficult to cover genetic drift, when genes, genetics, cells have not yet been covered. It is also a “backwards” mission to teach photosynthesis when cells have not been covered.

The basics of Biology is at the molecular level, and in order to guide students in their discovery of how Biology rules their lives, teachers should begin at the micro level and build up to the Macro where they will then be able to review/tie in all concepts that make biology the greatest subject on Earth.
CER: Biology Topic Pacing for 2016-2017

Claim
It is our opinion to build the case from Micro to Macro approach. Start a frame work to build the foundation and fundamentals constructively. (A build up approach)

Strategies
1- Scientific thinking:
   a. Safety
   b. Introduction to Biology
   c. Laboratory reports.
   d. Comprehension/strategies
   e. What is Biology?

2- Biochemistry
   a. Water, enzymes, carbon, organic compounds.

3- Ecology
   a. Food Web / Energy
   b. Biogeochemical cycles
   c. Biosphere-Biomes- Populations
   d. Human activity

4- Cells
   a. Structure
   b. Plants/Animals cells
   c. Prokaryotes- Eukaryotes cells

5- Photosynthesis / cellular respiration

6- Genetics

7- Molecular genetics
   a. Biotechnology

8- Evolution
   a. History of life

9- Classification

10- Plants / Animals

11- Organ systems

12- Factors affecting human health

Reasoning
1- Better instruction flow
2- More organized. From foundation to structure
3- Continuum learning process
4- Cementing relationship and comprehension in content and comprehension
5- Embed all aspect of scientific thinking throughout the curriculum
Claim: Current Pacing guide is a good design.

Evidence: NSTA supports macro→micro
   Easier Transitioning from middle school to high school level because of the familiarity of Ecology
   Increased Retention with these first topics
   Around 40% of EOC content are these first topics

Reasoning: It is easier to start with ecology and the ADI concepts support this. Students of all levels already have the common language of ecology can start argument driven inquiry without a problem. Engagement will be increased as students love learning about animals and there is so much awesome content in ecology as opposed to molecules. Lab design is much easier to learn if they are dealing with previously taught content of ecology. Unfamiliar topics will be a barrier for students to design and defend experiments if they cannot grasp the very basics of the content. If the goal is to increase critical thinking which can be applied to further topics, it is important to start this process with content that will not be a barrier to set up experiments and drive student argumentation of data/design.
CER: Biology Topic Pacing for 2016-2017

The Question:
Why is there a variance in the progression plan of the District Pacing Guide?

CLAIM
X has decided as a TEAM to variate the order of the District Pacing Guide and follows a trend from a “Micro” to a “Macro” approach as it relates to Biology.

EVIDENCE
1) The Text book is sequential from Chapter to chapter, meaning it is a consistent flow aligning the Micro to Macro approach.
2) This demonstrates a step by step building approach to assist students to better understand the subject; seeing small to large concepts.
3) By data, our students have demonstrated a more complete understanding in building from the base up, this is scaffolding and are able to fully integrate the scientific theories, laws, concepts, and comprehension so as to make connection.
4) Couple years ago the District Plan was used from Micro to Macro prior to the EOC, the students then had a more complete understanding of the subject as evidenced by their mid-term and final exams scores.
5) Later, the District changed to Macro to Micro, we did it the first year and noted a shift.
6) Subsequently as a team we reverted to the Micro to Macro approach and saw better results with the exception of last SY 2015-2016.
7) Looking at an example: As a team, we noted that students did not understand the chemistry and concept of cell in evolution and taxonomy, resulting in us ordering the scope and sequence with “Scientific Principles”, “Chemistry of Life”, “Ecology”, and “cells”… in the progressive order (as per textbook).
8) Throughout each theme, the concepts are continuously highlighted and emphasized to reinforce and recall.

REASONING
The Principle of sequentially following Micro-to Macro approach shows a more complete and thorough understanding of our students needs and able to scaffold, use of strategies including graphic organizers (reading and writing), and 1-1 support along with their textbooks and teacher explanation.

As indicated by the evidence there has been incremental success towards our goal of students being able to fully grasp the concepts taught along with the comprehension of such and make connection in the broader context.

Therefore, as a Team at Felix Varela Senior High we have made variations in the District Pacing Plan by reordering the given concepts from a Micro-Macro Approach. We are all following the plan as per team's decision as it inclusive.

Additionally, the Team continually accesses the trends and if there needs to be changes, it is discussed, decided on and implemented. (*The process is an active engagement and dynamic).
CLAIM- The current pacing guide where students learn high school Biology in the order from Macro to Micro is the most efficient way to teach Biology to 10th grade high school students, to achieve better End of Course exam scores in Biology.

EVIDENCE- End of course exams over the last few years under the new pacing guide (Macro-to-Micro) have shown increased student performance both at the school level and at the district level. There was a decrease last school year, but that decrease was seen across the state (which suggests that the test might have been different than in the past years).

REASONING- Students understand concepts pertaining to Macro-Biology better than Micro-Biology, which taught early on (First/Second nine weeks and not during testing season-February/March), students tend to understand better and thus perform better in the End of Course. Also, these concepts (macro-Biology) tend to be heavily assessed in the EOC, thus students get more of those questions correct and score better than if taught the traditional way.
CER: Biology Topic Pacing for 2016-2017

Claim:
The most effective way to teach the information required in Biology is by teaching from micro to macro perspective in the beginning and then grouping standards by scaffolding by key ideas.

- Introduction to Biology
- Ecology
- Macromolecules
- Cells
- Origin of Life
- Cellular Processes
- Plant structure/Function
- DNA/RNA, replication and synthesis
- Mitosis
- Genetics
- Meiosis
- Body systems
- Classification
- Evolution

Evidence:
Some schools whether they were following the pacing guide or not saw increases in scores. From what I saw on their website, Volusia County teaches Micro to Macro and the have great scores.

Reasoning
Ecology is something they have seen in middle school and is something they can easily relate to at the beginning of the year. The students should have covered some basic chemistry in physical science to ease them into macromolecules. Also this information is difficult for the students to grasp and if we introduce it in the beginning of the year, we can revisit it again and again throughout the year.
Claim:

The most effective sequence to teach the information required in the Biology 1 course is by teaching from a Micro- to Macro- perspective.

The current teachers at X follow a Micro to Macro approach, starting with Macromolecules and finishing with Ecology, creating a fundamental knowledge of the building blocks of matter before addressing complex biological relationships.

The outline of the course is as follows:
- Biochemistry
- Molecular Genetics
- Genetics
- Reproduction
- Human Body
- Classification
- Evolution
- Ecology

Evidence:

Since the inception of the Biology I End of Course Exam teachers at X have used the Micro to Macro perspective. Over the past Biology I End of Course Exam years, the teachers at X have consistently earned a 90% rate and above.

Justification/Reasoning:

Years of data have shown that the Micro to Macro perspective has worked for our students. This perspective allows our teachers to start with the biological building blocks and build on them. In this process, our teachers are able to constantly review back to the make up of their topic. This consist review reinforces material already learned and aids in knowledge retention.
Claim
The most effective sequence to teach the information required in the Biology 1 course is by teaching from a Micro- to Macro-perspective.

The outline of the course should be as follows:
- BIOCHEMISTRY (What are the basic building blocks)
- MOLECULAR GENETICS (How does your genetic code determine an organism’s physical appearance?)
- GENETICS (How do inherited traits lead to variations?)
- REPRODUCTION (How do organisms grow and reproduce?)
- CLASSIFICATION (Why do scientists classify living things the way they do?)
- EVOLUTION (How do scientists think life began and continues to change on Earth?)
- ECOLOGY (How do interactions among organisms impact the changing environment?)
- HUMAN BODY (How are human body systems different?)
- FACTORS THAT AFFECT HUMAN HEALTH (After EOC)

Evidence
Students in middle school learn about biology in 6th and 7th grade, and have a review of Biology before the FCAT in 8th grade. Students in 9th grade take the Physical Science course, which is formatted to address Physics in the first semester and Chemistry in the second semester. At this point, students should have a working knowledge of basic Chemistry. If Biology is taught Micro- to Macro- they will have a higher proficiency in the Biochemistry component and be able to build on the more complex topics.

The Biology 1 course has very specific standards/benchmarks that are specified by the Item Specifications Guide. In our school, every Biology teacher prefers the Micro- to Macro- approach. What we have seen with our school is that students perform better in the Biology EOC when this approach is taken.

Data:
Percentage of students scoring 3 and above on Biology EOC

<table>
<thead>
<tr>
<th>Year</th>
<th>Score</th>
<th>Pacing Guide</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013-2014</td>
<td>71%</td>
<td>No</td>
</tr>
<tr>
<td>2014-2015</td>
<td>66%</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Justification/Reasoning
Based on EOC results from the past 2 years, students that were taught Micro- to Macro- tested at a higher level of proficiency than students in a Regular/Honors Biology course. The Cambridge IGCSE curriculum is presented in a Micro- to Macro- format. Evidence has shown that those students have a higher passing rate as well as a higher score on the Biology EOC. In 2014-2015, the Biology teachers were highly encouraged to follow the current Biology Pacing Guides. This, in turn, resulted in a 5% decrease in our EOC passing rate.
CLAIM:
Changing the current pacing guide will help increase the overall % proficiency of students attaining a EOC Level 3 or higher on the Florida Biology EOC Assessment.

EVIDENCE:

<table>
<thead>
<tr>
<th>County</th>
<th>% Passing</th>
<th># Students Tested</th>
<th>Pacing Guide (difference to MDCPS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broward</td>
<td>64</td>
<td>19,290</td>
<td>Start with biochemistry, end with Body Systems &amp; Ecology</td>
</tr>
<tr>
<td>Dade</td>
<td>63</td>
<td>27,980</td>
<td>Macro – Micro</td>
</tr>
<tr>
<td>Orange</td>
<td>67</td>
<td>15,370</td>
<td>Start with biochemistry, end with Ecology &amp; Body Systems</td>
</tr>
</tbody>
</table>

REASONING:
In analyzing the data, out of the three counties that were analyzed Miami-Dade County had the lowest percentage. There was only a 1% difference in Broward County. The county with the greatest percent passing was Orange County. Therefore, Miami-Dade County should revisit the flow of topics to see if an improvement will be seen in test scores. Further analysis would need to be completed to see the demographics among the three counties used as a comparison.